

MICRO

THE 6502 JOURNAL



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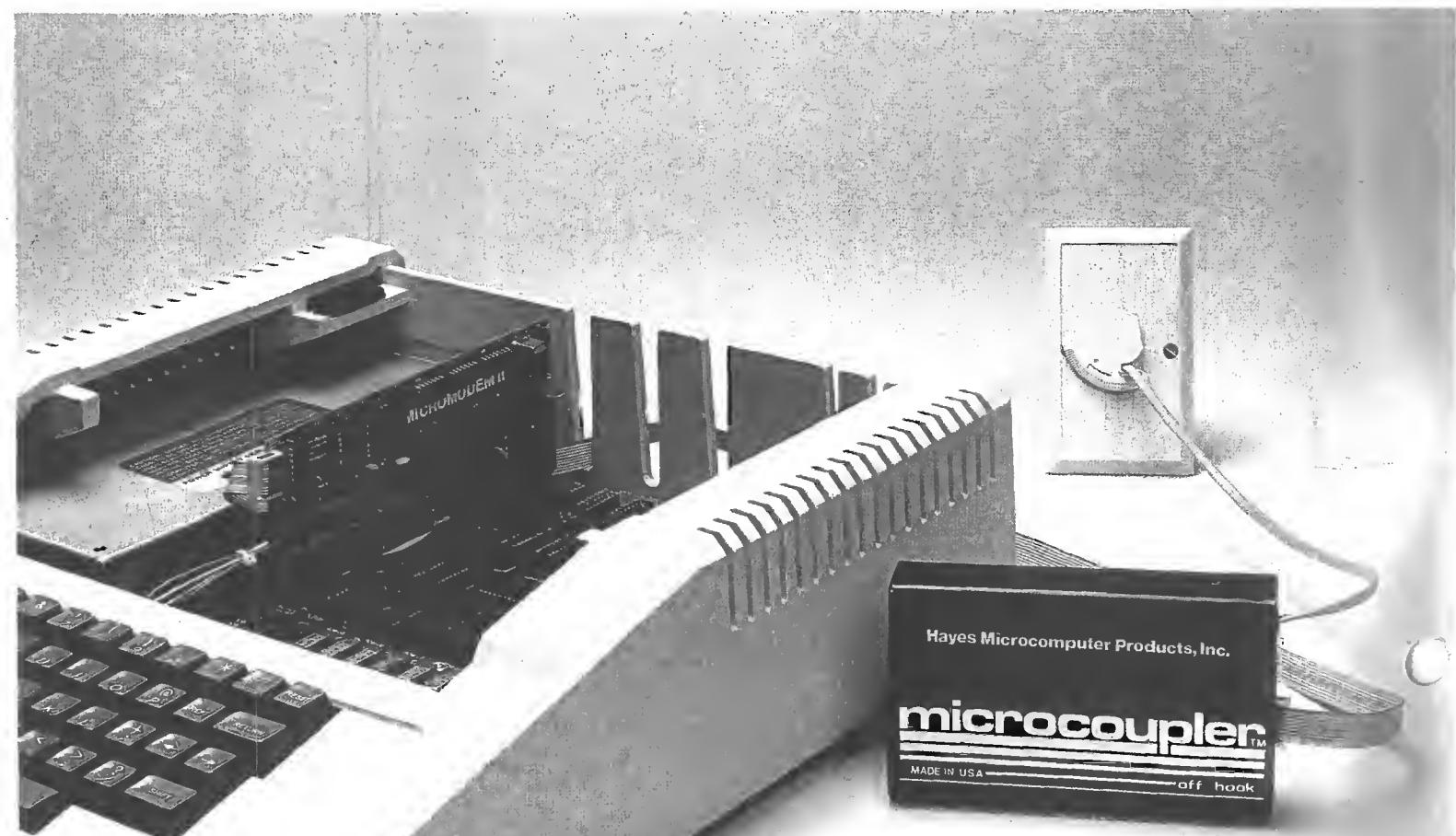
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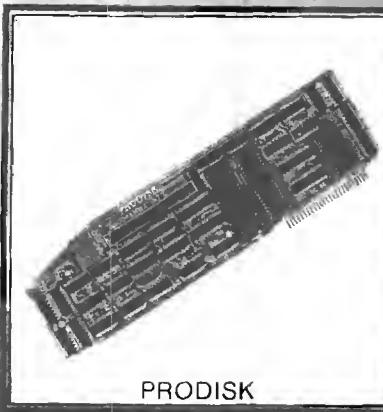
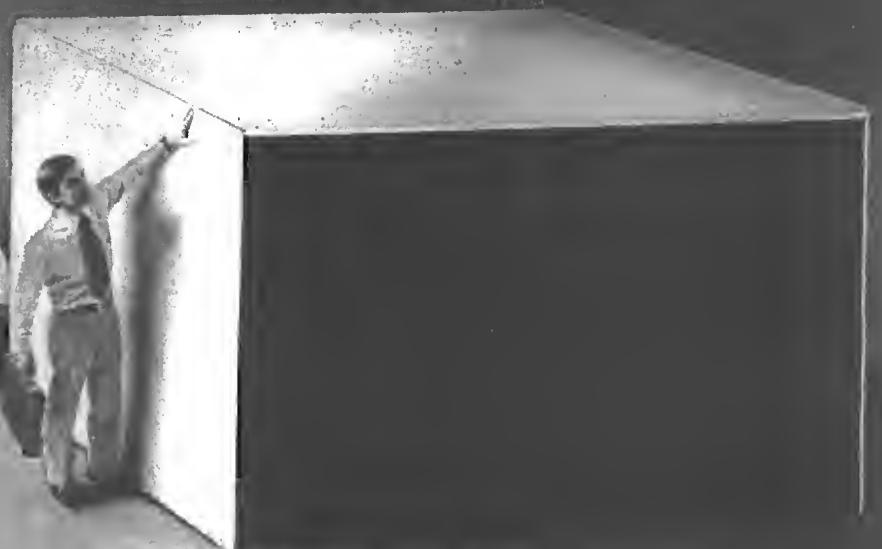
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MICRO

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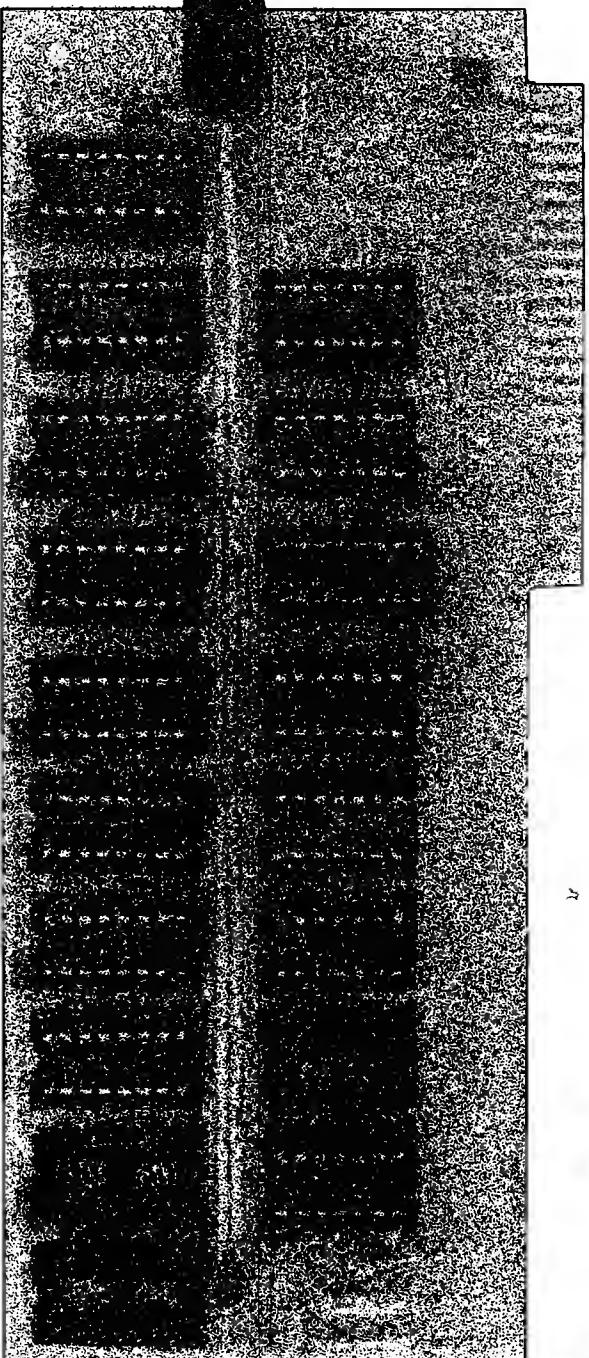
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MICRO

Editorial

Staff and Stuff

Most readers probably never read the staff listing on the Table of Contents page, but those who do will note that since the beginning of this volume, (June 1980) we have added an associate publisher, special projects editor, art director, advertising manager, three micro specialists and a typesetter. This improved staffing permits MICRO to deliver a better product each month and to undertake a number of other projects as well.

One major undertaking is book publishing. A series of Apple books is under way, with the first, *MICRO/Apple, Volume 1*, to be released April 1. This collection of Apple articles from past issues of MICRO is intended for the beginner-to-intermediate Apple user. All of the material has been re-edited, re-typeset and many articles have been updated by the original authors and/or the MICRO staff. All programs have been re-entered, listed and tested. They are provided on a diskette which is an integral part of the book. The 224-page book is wire-bound

and lies flat when open to make it easy to use.

Other books in the *MICRO/Apple* series will include reprints, original articles, new reference works, and more. This will permit us to present various types of material which do not work well in a magazine format: long articles or listings, good articles of limited scope, and so forth.

We are looking for additional material for other major microcomputers to support similar books for the PET, OSI, AIM, SYM, KIM and Atari. If you have material which you may not have submitted because you felt that it was not suited to a magazine presentation, please consider it for one of the books. If you have a complete manuscript for a 6502-based book, or even just the idea for one, please contact us. We may be interested in publishing it and distributing it to the 6502 world through our dealer network.

An Apple Solution

The February editorial addressed the problem of "Too Many Apples"—more Apple articles on a regular basis than we can incorporate in MICRO without overwhelming the other 6502-based microcomputers. The reader response may be summarized as:

no one favored "no change" or "print the extra Apple material in book form";

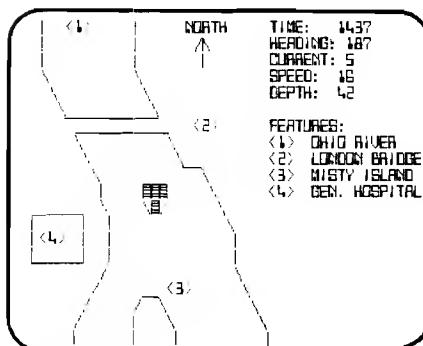
only a few wanted to "print the best material without regard to microcomputer";
more wanted to "publish an Apple supplement or quarterly" or "publish a monthly Apple magazine";
most chose to "increase the size of MICRO to accommodate additional Apple material without reducing the coverage of the other micros."

This reader feedback and our in-house staff discussions agree, and the decision has been made to expand MICRO. Starting with the June 1981 issue, there will be "extra" pages devoted to Apple articles and advertisements. The number of pages will be determined partially by the extra advertising required to cover the additional production, printing and postage costs—without requiring an increase in either the single copy or subscription price. There will be at least 16 extra pages, and possibly 32 pages. This expansion will permit us to provide timely Apple coverage while maintaining our policy of serving the entire 6502 community.



Robert M. Tripp
Editor/Publisher

About the Cover—



Screen display on this month's cover — from the human point of view.

(Cover photo by Michael Rakip)

Cruising Down the River...

Imagine yourself cruising down the river on the Delta Queen. To navigate rivers you need maps and charts. Currently these are available as printed material, very detailed and very accurate. Accurate? Well, the chart was accurate when it was made, but how long ago was that? And what changes have occurred since then?

How about a computer displayable map—one that could be updated continuously by whatever authority has the charting responsibility, the U.S. Coast Guard or the U.S. Geodetic Survey? A diskette could be generated which contains the latest information along a particular route. It could provide whatever level of detail is required; from an overview as pictured on the cover, to the detail normally provided in navigational charts. As the position of the vessel is

entered into the computer, manually in a simple system or automatically in a more advanced one, the display could change to provide the current map information.

In addition to the pure mapping function, the computer could provide a wealth of other information. Time of day, current speed, vessel speed, direction, rate of fuel consumption, estimated time to destination or check point, and other operating parameters could be displayed. Automatic radio tracking equipment could provide accurate positioning information. Depth information in coastal waters could be continuously updated and modified as a function of tide tables. The possibilities for this type of microcomputer application are almost limitless.

But for now, I guess I'll just keep drifting.

MICRO

Letterbox

Dear Editor:

First, I don't know of any available printed material that has been as interesting and informative as "MICRO Magazine".

Many little problems related to programming have been removed due to the care and testing that is done, by writers, proofreaders, editors and by the production people. The quality is outstanding as witnessed by the brevity of your "Microbes" pages.

Now, the second part—I feel that I have received more value from this source than it has cost. Therefore, I offer this little tip for Apple II owners fortunate enough to have Disk II. Perhaps I am lazy, but my fingers get tired of constantly typing "catalog" following the end of a program. I know that many programs exist to change the disk command to cat or just plain 'C'. They are good, but why not insert these lines in place of "END" statement in the programs used frequently?

```
XX0 INPUT"Want Disk
        Catalog (Y/N) ?";A$
XX1 TEXT:HOME
XX2 IF A$ = "Y" THEN PRINT
        D$;"Catalog"
```

Your program is still in memory should you choose to re-run it. Or with the catalog menu in front of you, a change to a different program is quite simple.

Another simple little tip is to type "VTAB < 1 THROUGH 20 >" to move the cursor up to the program desired, enter your command, and use the right arrow key to trace over the program listing, hit return, and your command is executed. Be sure that you don't leave any part of the program type or sector information before tracing over the program title. Those little left-overs produce nice error statements.

Thanks again for an excellent publication. I look forward to seeing it each month for it makes the Apple II more enjoyable for this retired telephone man who is pretty much housebound.

John A. Backman
 302 North 76th
 Seattle, WA 98103

Dear Editor:

I appreciated the letter by Robert V. Davis, MICRO, January 1981, but his letter didn't take full advantage of OSI's BASIC-in-ROM accuracy and he doesn't solve the absence of the PRINT USING command for anything but whole dollars.

That would be trouble if you're working in any accounting program where you need to keep track of pennies. The subroutine I am enclosing will print out amounts in dollars and cents from \$0.00 to \$167,772.15 with full accuracy and amounts close to one billion with 7+ decimal accuracy before going into scientific notation errors. Since Michigan income tax asks that you don't round off at one place, this program would keep you out of trouble with the taxman. Also by simply changing the value of H in line 20000 by a power of ten, and making the opposite change of T, you can set up for printing in the thousandth place or any other decimal place you wish with 7+ decimal accuracy. This routine will also increase the amount of decimals printed with any other BASIC computer.

```
50 INPUT"AMOUNT OF
        CASH";B: A=B
60 PRINT"BALANCE":GOSUB
        20000
70 REM REST OF PROGRAM
19999 PRINTING SUBROUTINE
20000 H = 100:T = 1000:
        G = 0:C = A:IF A > T*9
        THEN G = T*INT(A/T):C =
        A - G + T
20010 PLACE = INT(LOG
        (H)/LOG(10) + .5):IF A < 1
        THEN 20070
20020 A$ = STR$(INT(H* C + .5)):
        AC$ = RIGHT$(A$,PL):
        B = LEN(A$)
20030 A$ = LEFT$(A$,B-PL) +
        ".":AC$:IF G > 0 THEN
        A$ = STR$(G/T) + MID$(A$,3)
20040 PRINT TAB(20-LEN(A$))" "
        ";A$:RETURN
20060 REM AMOUNTS LESS
        THAN 1
20070 A$ = STR$(INT(A*H
        + .5)/H):IF
        LEN(A$) < PL + 2 THEN
        A$ = A$ + "0":
        GOTO20070
20080 GOTO20050
```

Dale Mayers
 2301 S. Washington
 Lansing, MI 48910

Dear Editor:

I'd like to share the following information in response to your Editorial in the January 1981 issue (MICRO Goes to School).

Our math department was given the job of learning how to operate the computers, then teach our students, then teach any interested non-math teachers. Granted, year #1 was trial and error. We spent many hours on our own time getting our act together.

Several members of the department formed a core group which learned how to program and joined area users groups, and then brought this information back to the rest of the department for general use. We subscribe to the leading magazines for help and greatly appreciate MICRO's help with the Club Circuit.

By using small ads, we have contacted and exchanged ideas, programs, and student booklets with teachers in several states. There is a vast network out there of independent math teachers which the computer will bring together.

This year, in our lab, we are more organized. Lab slots are assigned on a week-to-week basis and we have lab assignments sheets for the students, that they receive before they enter the lab. The sheets contain information as to what programs they should work on, what section of particular programs, what disks to use, which computers to be worked on, if the printer is to be used, etc. Thus, any computer center means preparation by the teachers involved if the center is to achieve its goals in the educational environment. And with the availability of data base programs, the department has its grades, orders, inventory, small supplies, etc., on disk.

Our computer center has taken a lot of effort, but it is well worth it. If any teacher or department requires more information, they may write to Apple Bit'N Pieces Educators Group c/o our school.

Patrick J. Calebrese
 Math Dept. Chairman
 Millcreek Township School District
 Millcreek Middle School—J.S. Wilson
 900 West 54th Street
 Erie, PA 16509

S-C Assembler Modifications

The usefulness of the S-C assembler for the Apple can be enhanced with the addition of a command to automatically generate line numbers for the programmer while he is entering the source code.

Ned W. Rhodes
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Arlington, Virginia 22205

The S-C assembler is one of the many assemblers available for the Apple computer system. The original version of the S-C assembler was cassette-based and performed well for the user with a minimal system. Subsequent versions of the assembler have been disk-based. With the announcement of version 3.2, previous owners were invited to upgrade their assemblers for \$12.50. This I did, and along with my upgrade kit came information on how the S-C assembler could be modified to incorporate more features. In this article I will describe modifications to the S-C assembler that allow the S-C assembler to work with the auto-start ROM, automatically generate line numbers for source code entry, and allow the user to change the starting line number and increment for the auto-line numbering mode.

Adding Back the Multiply Routine

In the auto-start ROM, Apple has incorporated some features that make line editing easier and allow the Apple to automatically boot itself when power is applied. In order to give us all of these features, they had to replace some old (and very useful) code in the F8 ROM with their new routines. One of the deleted routines happened to be the Integer multiply routine which is used by the S-C assembler. So, if you have the auto-start ROM, you must patch the assembler and add the multiply code in order to make the

Listing 1

```

1000 *
1010 *
1020 *
1030 *
1040 *
1050 *
1060 *
1070 *
1080 * ROUTINE TO DO AUTO NUMBERING
1090 *
1100 *
1110 .OR $1D21 AFTER MULTIPLY ROUTINE
1120 *
1130 *
1140 * DO WE DO IT??
1150 *
1160 *
1D21- 2C 7D 1D 1170 A NUM BIT FLAG TEST AUTO-FLAG
1D24- 10 27 1180 BPL EXIT NOT TURNED ON
1D26- 4E 7D 1D 1190 LSR FLAG CLEAR THE FLAG
1D29- E0 00 1200 CPX #0 IF NOT IN COLUMN 1
1D2B- D0 20 1210 BNE EXIT THEN DON'T DO IT
1220 *
1230 *
1240 * PRINT IT OUT, AND STORE IN
1250 * INPUT BUFFER
1260 *
1270 *
1D2D- 20 5C 1D 1280 JSR CONV4 CONVERT LINE NUMBER
1290 *
1300 *
1310 * INCREMENT THE LINE NUMBER
1320 *
1330 *
1D30- F8 1340 SED SET DECIMAL MODE
1D31- 18 1350 CLC CLEAR CARRY
1D32- AD 7A 1D 1360 LDA NUM+1 ADD LSBS
1D35- 6D 7C 1D 1370 ADC INC+1
1D38- 8D 7A 1D 1380 STA NUM+1
1D3B- AD 79 1D 1390 LDA NUM ADD MSBS
1D3E- 6D 7B 1D 1400 ADC INC
1D41- 8D 79 1D 1410 STA NUM
1D44- DB 1420 CLD SET BINARY MODE
1D45- A9 A0 1430 LDA #$A0 SEND A SPACE TOO
1D47- 20 72 1D 1440 JSR CHO
1D4A- 4C OC FD 1450 JMP $FDOC INPUT NEXT CHARACTER
1460 *
1470 *
1480 * CALL THE MONITOR TO READ KEY
1490 * CHECK IF CONTROL-N.
1500 * IF SO, SET AUTO-FLAG AND
1510 * CHANGE TO CARRIAGE RETURN
1520 *
1530 *
1D4D- 20 1B FD 1540 EXIT JSR $FD1B MONITOR KEYIN
1D50- C9 8E 1550 CMP #$8E CONTROL-N??
1D52- D0 05 1560 BNE RTN NO
1D54- A9 8D 1570 LDA #$8D CHANGE TO CONTROL-N
1D56- 8D 7D 1D 1580 STA FLAG SET FLAG
1D59- 4C 8B 13 1590 RTN JMP $138B RE-JOIN SCAL
1600 *
1610 *
1620 * CONVERT AND STORE FOUR DIGITS
1630 *
1640 *
1650 CONV4
1D5C- AD 79 1D 1660 LDA NUM FIRST TWO DIGITS
1D5F- 20 65 1D 1670 JSR CONV2 LAST TWO DIGITS
1D62- AD 7A 1D 1680 LDA NUM+1
1690 *
1700 *
1710 * CONVERT AND STORE TWO DIGITS
1720 *

```

assembler run properly. Bob Sander-Cederlof (the S-C assembler creator) included the patch along with my upgrade kit and I will repeat it here.

Before we can patch the assembler, we have to create some room for the patch. Bob suggested that we move the starting address of the symbol table up a page or two, and make all patches and modifications in this new space. The assembler resides in memory from \$1000 through \$1BFF, and the symbol table follows, starting at \$1C00. The moving of the symbol table is accomplished by changing location \$1010 in the assembler. Now, I suggest that we start the symbol table at \$1E00 so that we have plenty of room for the enhancements that are to be described later on. The step-by-step instructions for moving the symbol table are:

1. Load the assembler
2. Change contents of \$1010 to \$1E
3. Re-save the assembler using BSAVE ASMB,A\$1000,L\$E00

Note that the older versions of the assembler may also be patched in this fashion, but that the address to be patched will not necessarily be the same. In that case, use the Monitor disassembler and examine memory on either side of address \$1010 until you find either a \$1C or \$1D, as that was the default-starting page number of the symbol table.

The multiple routine may now be added, starting at location \$1D00 using the monitor insert command.

```
*1D00: A0 10 A5 50 4A 90 0C 18
      A2 FE B5 54 75 56 95 54
*1D10: E8 D0 F7 A2 03 76 50 CA
      10 FB 88 D0 E5 60
```

And finally, we need to change the JSR instruction that points to the multiply routine to point to the relocated code for the multiply routine. You should find a JSR \$FB63 at location \$1122. The following will change the destination address to \$1D00.

```
*1123: 00 1D
```

Now, the assembler may be saved as instructed in step 3 above. This modified version of the assembler will now work properly with the auto-start ROM.

Automatic Line Numbers

The other little goodie that Bob included in my upgrade kit was a routine that allowed the assembler to automatically generate line numbers so

| | | |
|----------------|-------------------|--------------------------|
| 1D65- 48 | 1730 * | |
| 1D66- 4A | 1740 CONV2 | |
| 1D67- 4A | 1750 PHA | SAVE BYTE ON STACK |
| 1D68- 4A | 1760 LSR | GET LEFT DIGIT |
| 1D69- 4A | 1770 LSR | |
| 1D6A- 20 70 1D | 1780 LSR | |
| 1D6D- 68 | 1790 JSR CONV1 | CONVERT AND STORE IT |
| 1D6E- 29 0F | 1800 PLA | GET BYTE FROM STACK |
| | 1810 AND #\$0F | ISOLATE SECOND DIGIT |
| | 1820 AND #\$0F | |
| | 1830 CONV1 | |
| 1D70- 09 B0 | 1840 ORA #\$80 | CONVERT TO ASCII |
| 1D72- 9D 00 02 | 1850 STA \$200,X | STORE IN INPUT BUFFER |
| 1D75- E8 | 1860 INX | INCREMENT BUFFER POINTER |
| 1D76- 4C ED FD | 1870 JMP SFED | PRINT THE CHARACTER |
| | 1880 * | |
| 1D79- 1J 00 | 1890 NUM .HS 1000 | INITIAL NUMBER |
| 1D7B- 00 10 | 1900 INC .HS 0010 | INCREMENT |
| 1D7D- 00 | 1910 FLAG .HS 00 | |
| | 1920 .END | |

SYMBOL TABLE

| | | | | | |
|-------|------|-------|------|-------|------|
| A NUM | ID21 | EXIT | ID4D | RTRN | ID59 |
| CONV4 | ID5C | CONV2 | ID65 | CONVI | ID70 |
| CHO | ID72 | NUM | ID79 | INC | ID7B |
| FLAG | ID7D | | | | |

Listing 2

| | | |
|----------------------|--|---------------------------|
| 1000 * | | |
| 1010 * | | |
| 1020 * | | |
| 1030 * | | |
| 1040 * | | |
| 1050 * | | |
| 1060 * | | |
| 1070 * | THIS ADDS THE AUTO COMMAND TO THE | |
| 1080 * | S-C ASSEMBLER. THE AUTO COMMAND | |
| 1090 * | ALLOWS YOU TO SET THE STARTING LINE, | |
| 1100 * | NUMBER AND THE INCREMENT FOR AUTOMATIC | |
| 1110 * | LINE ENTRY. | |
| 1120 * | | |
| 1130 * | THE FORMAT OF THE COMMAND WILL BE: | |
| 1140 * | | |
| 1150 * | AUTO START,INC | |
| 1160 * | | |
| 1170 * | | |
| 1180 SPACE .EQ \$20 | SPACE | |
| 1190 LBUF .EQ \$200 | LINE BUFFER | |
| 1200 COMMA .EQ \$2C | COMMA | |
| 1210 WARM .EQ \$1003 | WARM START | |
| 1220 NUM .EQ \$1D79 | STARTING LINE NUMBER | |
| 1230 INC .EQ \$1D7B | INCREMENT | |
| 1240 .OR \$1D7F | AFTER THE AUTO LINE NUMBER GENERATOR | |
| 1250 * | | |
| 1260 * | | |
| 1270 * | | |
| 1280 AUTO LDY #3 | START AT FOURTHCHARACTER | |
| 1290 SLOP LDA LBUF,Y | GET CHARACTER | |
| 1D83- F0 60 | 1300 BEQ DONE | ALL DONE—DO NOTHING |
| 1D85- C9 20 | 1310 CMP #SPACE | IS IT A SPACE?? |
| 1D87- F0 03 | 1320 BEQ GSPAC | YES |
| 1D89- C8 | 1330 INY | BUMP Y |
| 1D8A- D0 F4 | 1340 BNE SLOP | IDLE UNTIL A SPACE |
| 1350 * | | |
| 1360 * | | |
| 1370 * | GOT A SPACE. | IDLE UNTIL NO MORE SPACES |
| 1380 * | | |
| 1390 * | | |
| 1400 GSPAC | | |
| 1D8C- C8 | 1410 INY | BUMP Y |
| 1D8D- B9 00 02 | 1420 LDA LBUF,Y | GET CHARACTER |
| 1D90- F0 53 | 1430 BEQ DONE | WE ARE DONE |
| 1D92- C9 20 | 1440 CMP #SPACE | IS IT A SPACE |
| 1D94- F0 F6 | 1450 BEQ GSPAC | LOOP UNTIL NO SPACE |
| 1460 * | | |
| 1470 * | | |
| 1480 * | COUNT THE NUMBER OF CHARACTERS | |
| 1490 * | UNTIL THE "," AND SAVE THE POSITION | |
| 1500 * | NUMBER OF THE LAST CHARACTER. | |
| 1510 * | | |
| 1520 * | | |
| 1D96- A2 00 | 1530 LDX #00 | GET A ZERO |
| 1D98- C9 2C | 1540 CLOP CMP #COMMA | IS IT A COMMA?? |
| 1D9A- F0 09 | 1550 BEQ SAVIT | YES |
| 1D9C- E8 | 1560 INX | BUMP COUNT |
| 1D9D- C8 | 1570 INY | BUMP CHARACTER SCAN |
| 1D9E- B9 00 02 | 1580 LDA LBUF,Y | GET NEXT CHARACTER |
| 1DA1- F0 02 | 1590 BEQ SAVIT | SAVE PARAMETERS |
| 1DA3- D0 F3 | 1600 BNE CLOP | TRY AGAIN |
| 1610 * | | |
| 1620 * | | |
| 1630 * | WE GET HERE AND SAVE X AND Y FOR LATER | |

```

1640 *
1650 *
1660 SAVIT
1DA5- 8E 2D 1E 1670 STX SCNT SAVE COUNT
1DA8- BC 2E 1E 1680 STY EPoS END POSITION + 1
1DAB- B9 00 02 1690 LDA LBUF,Y GET CHARACTER AGAIN
1DAE- F0 1E 1700 BEQ DSTRT IF ZERO GO AWAY
1710 *
1720 *
1730 * SCAN THE INCREMENT
1740 *
1750 *
1DB0- C8 1760 INY NEXT CHARACTER
1DB1- A2 00 1770 LDX #00 ZERO COUNT
1DB3- B9 00 02 1780 ILOP LDA LBUF,Y GET CHARACTER
1DB6- F0 04 1790 BEQ DINC DONE WITH SCAN
1DB8- E8 1800 INX BUMP COUNT
1DB9- C8 1810 INY NEXT CHARACTER
1DBA- D0 F7 1820 BNE ILOP REPEAT TIL DONE
1830 *
1840 *
1850 * CONVERT THE INCREMENT AND SAVE
1860 *
1870 *
1DBC- 8A 1880 DINC TXA SET CONDITION CODE
1DBD- F0 OF 1890 BEQ DSTRT IF ZERO DO START
1DBF- 20 EB 1D 1900 JSR GETNUM CONVERT NUMBER
1DC2- AD 2F 1E 1910 LDA HOLD GET NSB
1DC5- 8D 7B 1D 1920 STA INC SAVE
1DC8- AD 30 1E 1930 LDA HOLD+1 GET LS8
1DCB- 8D 7C 1D 1940 STA INC+1 SAVE
1950 *
1960 *
1970 * DO THE START LINE NUMBER
1980 *
1990 *
2000 DSTRT
1DDC- AE 2D 1E 2010 LDx SCNT GET COUNT
1DD1- F0 12 2020 BEQ DONE IF ZERO -- IGNORE
1DD3- AC 2E 1E 2030 LDY EPoS GET POSITION
1DD6- 20 E9 1D 2040 JSR GETNUM CONVERT
1DD9- AD 2E 1E 2050 LDA HOLD GET MSB
1DDC- BD 79 1D 2060 STA NUM SAVE
1DDF- AD 30 1E 2070 LDA HOLD+1 GET LS8
1DE2- 8D 7A 1D 2080 STA NUM+1 SAVE
2090 *
2100 *
2110 * DONE OR ABORT
2120 *
2130 *
1DE5- 4C 03 10 2140 DONE JMP WARM WARM START
2150 *
2160 *
2170 * GETNUM -- CONVERTS ASCII TO BCD
2180 *
2190 *
2200 GETNUM
1DER- A9 00 2210 LDA #00 GET A ZERO
1DEA- 8D 2F 1E 2220 STA HOLD ZERO OUT
1DED- 8D 30 1E 2230 STA HOLD+1 ZERO OUT
1DF0- 20 20 1E 2240 JSR READ8 GET 8 BITS
1DF3- 8D 30 1E 2250 STA HOLD+1 SAVE BITS
1DF6- CA 2260 DEX DECREMENT LOOP COUNT
1DF7- F0 26 2270 BEQ EXT DONE
1DF9- 20 20 1E 2280 JSR READ8 GET 8 BITS
1DFC- 20 27 1E 2290 JSR SHIFT SHIFT LEFT 4
2300 *
1DFF- 18 2310 CLC CLEAR CARRY
1EO0- 6D 30 1E 2320 ADC HOLD+1 PUT IN BITS
1EO3- 8D 30 1E 2330 STA HOLD+1 SAVE BACK
1EO6- CA 2340 DEX DECREMENT LOOP COUNT
1EO7- F0 16 2350 BEQ EXT DONE
1EO9- 20 20 1E 2360 JSR READ8 GET 8 BITS
1EOC- 8D 2F 1E 2370 STA HOLD SAVE BITS
1EOF- CA 2380 DEX DECREMENT LOOP COUNT
1E10- F0 0D 2390 BEQ EXT DONE
1E12- 20 20 1E 2400 JSR READ8 GET BITS
1E15- 20 27 1E 2410 JSR SHIFT SHIFT LEFT 4
1E18- 18 2420 CLC CLEAR CARRY
1E19- 6D 2F 1E 2430 ADC HOLD ADD IN BITS
1E1C- 8D 2F 1E 2440 STA HOLD SAVE BACK
1EIF- 60 2450 EXT RTS RETURN
2460 *
2470 *
2480 * READ8 -- READ 8 BITS FROM LINE BUFFER
2490 *
2500 *
2510 READ8
1E20- 8B 2520 DEY DECREASE POINTER
1E21- B9 00 02 2530 LDA LBUF,Y GET CHARACTER
1E24- 29 OF 2540 AND #$0F ONLY FOUR BITS

```

as to relieve the programmer of that task. I have often wanted that sort of a feature when I am doing a lot of coding with the S-C assembler. I have included the code that will automatically generate the line numbers in listing 1. It is placed immediately after the multiply routine that is listed in the previous section. The steps that are required to incorporate the routine into the assembler are:

1. BRUN the assembler
2. Enter the source code from listing 1
3. Assemble the code using the assembler
4. Patch an assembler address that will allow access to the auto-line routine. Location \$1388 should contain a JSR \$FD1B. Change the address to \$1D21 using the monitor command:

*1389:21 1D.

The automatic line number routine is started by typing a control-N instead of a RETURN. So, whenever you type control-N, the assembler will generate a carriage return, a line feed, and then display the next line number on the screen. I incorporated this routine in my assembler and was very happy with it with one exception. In order to change either the starting line number or the increment, you had to change the values stored in memory. This soon got to be very tedious, especially when I had to refer to the source listing in order to find the address that I had to change if I needed a different starting line number or increment. I longed for a command to change one or both of the numbers.

The 'AUTO' Command for the S-C Assembler

Listing 2 is the code to include the 'AUTO' command to the S-C assembler. The format of the AUTO command is the same as for Integer BASIC, which is:

AUTO starting line number,
increment.

The design of the routine is quite simple. First the routine goes to the input line buffer and begins to scan the command, beginning with character four. It throws away all characters until it finds a space. This is done so that the user may type any character string that starts with the first three letters 'AUT'. After we have encountered a space, we count the number of characters from there until the comma. This is the number of digits in the starting line number and this value is saved for later use. Note that this value can be zero,

which implies that you can change only the increment, but don't have to change the starting line number also [for example AUTO ,10].

Next we scan the character string, starting with the first character after the comma, and ending with the null byte that terminates the input buffer string. Again the number of characters is saved and, as mentioned above, it also may be zero if you only want to change the starting line number and keep the same increment [for example AUTO 1000]. The increment character string is converted from ASCII to BCD by the GETNUM routine. The resulting BCD number for the increment is saved as the new increment. Finally, the starting line number string is converted to BCD and saved as the new starting line number. Then we jump back to the assembler command mode.

Only a small problem now exists—there is no 'AUTO' command in the basic S-C assembler. We have two options: we can find the command dispatch table in the assembler and add another command to it [this may be complicated], or we can replace one of the existing commands with our new command. I chose to do the latter. The code at the end of listing 2 changes the 'JOIN' command to 'AUTO' by changing the ASCII command string and the address of the routine that actually does the command in the command dispatch table. As before, the code needs to be assembled as part of the assembler and saved as indicated above.

I have recommended that you create a source file and assemble that in order to incorporate these new features. This is not necessary, since I have included the object code as part of the listings. Instead, you could just enter the object code directly into memory and make the patches listed above. The only problem that I see with that method, is that it can be very tedious, if you were to make a small mistake. Also, it is a good idea to make yourself a back-up copy of the assembler until you have tested out your new and improved version.

Ned W. Rhodes received his BSEE from the University of Minnesota and his MS in Computer Science from the George Washington University in Washington D.C. He is currently employed by the David W. Taylor Naval Ship Research and Development Center, where he develops high-speed minicomputer-based data acquisition systems for use during full-scale trials aboard naval vessels.

MICRO

| | | | |
|----------------|------------------|---------------------------|------|
| IE26- 60 | 2550 | RTS | DONE |
| | 2560 * | | |
| | 2570 * | | |
| | 2580 | | |
| | 2590 * | SHIFT — SHIFT LEFT 4 BITS | |
| | 2600 * | | |
| | 2610 * | | |
| | 2620 SHIFT | | |
| IE27- 18 | 2630 CLC | CLEAR CARRY | |
| IE28- 2A | 2640 ROL | LEFT | |
| IE29- 2A | 2650 ROL | LEFT | |
| IE2A- 2A | 2660 ROL | LEFT | |
| IE2B- 2A | 2670 ROL | LEFT | |
| IE2C- 60 | 2680 RTS | RETURN | |
| | 2690 * | | |
| | 2700 * | | |
| | 2710 * | STORAGE | |
| | 2720 * | | |
| | 2730 * | | |
| IE2D- 00 | 2740 SCNT .HS 00 | COUNT | |
| IE2E- 00 | 2750 EPOS .HS 00 | POSITION | |
| IE2F- 00 00 | 2760 HOLD .DA 0 | TEMP STORAGE | |
| | 2770 * | | |
| | 2780 * | | |
| | 2790 * | CHANGE JOIN TO AUTO | |
| | 2800 * | | |
| | 2810 * | | |
| | 2820 .OR \$1289 | IN DISPATCH TABLE | |
| I289- 41 55 54 | .AS /AUT/ | AUTO COMMAND | |
| 128C- 7E 1D | .DA AUTO | ADDRESS | |
| | .EN | | |

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PRINT USING for the PET

This is an excellent PET version of Gary Morris' Apple program. It runs on any PET or CBM machine.

David Malmberg
43064 Via Moraga
Fremont, California 94538

Gary Morris recently published a PRINT USING program for the Apple in the October 1980 issue of *MICRO* [29:14]. His program made use of some of the ROM routines in Applesoft. Since Microsoft developed both Applesoft and the various versions of PET BASIC, I felt that Gary's routine could be easily adapted for the PET. After consulting Jim Butterfield's many memory maps of the PET ROMs, and a fair amount of experimentation, I succeeded in modifying Gary's basic routine to work on the PET.

Listing 1 is a BASIC program that POKEs the machine code for the routine into the second cassette buffer (from 826 to 984). This program also detects which of the three versions of BASIC is operable in the specific PET and modifies the machine code accordingly. This is done by PEEKing into location 50003 which contains a "0" for BASIC 2.0, a "1" for BASIC 3.0, and a "160" for BASIC 4.0. The program in listing 1 will also set the USR vector (locations 1 and 2) to point to the beginning of the code in the second cassette buffer. Once this program has been run, the machine language routine is available to any BASIC program via the USR function.

As an example of how this would be used, consider the following BASIC instructions:

```
10 ED$ = "$, 0.00"  
20 X = 123456  
30 PRINT "TOTAL IS "; Y =  
USR(X)
```

This sequence will cause the following to be printed:

```
TOTAL IS $ 1,234.56
```

The edit pattern to be used in formatting the output must be specified by the string variable ED\$. The edit pattern may contain almost any valid character (such as, \$ #, %, ' = / K . etc.). These characters will be "skipped over" and the various digits of the number will be inserted into the blanks of the edit pattern, or overlaid on any 0's in the pattern. The value to be printed will be edited from right to left. If the value is too large for the edit field, the left-most characters will be truncated. A comma in the pattern will be

printed only if there is at least one digit to the left of it. If the value is negative, the minus sign will be placed to the left of the highest digit.

The value to be edited is passed to the PRINT USING routine as the parameter of the USR function, e.g., X in the previous example. This parameter may be a complex expression, rather than just a variable or a numeric value. The value returned by the USR function to BASIC [Y in the previous example] will be garbage and have no meaning. Be careful not to use a variable name that is significant to the rest of the program as the left hand side of the USR equation.

Listing 1

```
10 PRINT "[CLR][2 DOWN]PRINT USING FOR THE PET"  
20 PRINT "[DOWN]BY DAVID MALMBERG"  
30 REM ADAPTED FROM A ROUTINE FOR THE APPLE  
40 REM BY GARY MORRIS IN OCT-1980 MICRO  
50 PRINT "[HOME]           LOADING 2ND CASSETTE BUFFER"  
60 FOR I = 826 TO 984 : READ I : POKE I : DC : PRINT "[HOME]" : I : DC : NEXT I  
70 REM BASIC 3.0 VERSION  
80 DATA 32,233,220,169,69,162,196,139  
90 DATA 66,134,67,32,201,207,160,2,177  
100 DATA 68,133,93,136,177,68,133,92,136  
110 DATA 177,68,201,16,144,2,169,16,141  
120 DATA 32,3,168,136,177,92,153,33,3  
130 DATA 136,16,248,160,0,185,0,1,240  
140 DATA 3,200,208,248,174,32,3,136,185  
150 DATA 0,1,72,104,72,201,45,208,14,189  
160 DATA 32,3,201,45,144,22,202,208,240  
170 DATA 104,24,144,54,189,32,3,201,32  
180 DATA 240,8,201,44,240,238,201,48,144  
190 DATA 234,104,157,32,3,202,240,32,192  
200 DATA 1,208,205,232,24,144,16,189,32  
210 DATA 3,201,36,240,17,201,46,176,5  
220 DATA 169,32,157,32,3,202,240,5,236  
230 DATA 32,3,144,232,174,32,3,169,0,157  
240 DATA 33,3,160,3,169,33,32,28,202,169  
250 DATA 0,133,7,96  
260 POKE 1,58:POKE 2,3:REM SET USR VECTOR  
270 IF PEEK(50003)<160 THEN 310  
280 REM BASIC 4.0 MODIFICATIONS  
290 POKE 827,147:POKE 828,207:POKE 838,135:POKE 839,193  
300 POKE 978,29:POKE 979,187  
310 IF PEEK(50003)<0 THEN 370  
320 REM BASIC 2.0 MODIFICATIONS  
330 POKE 827,175:POKE 828,220:POKE 838,215:POKE 839,207  
340 POKE 978,39:POKE 979,202:POKE 983,94  
350 POKE 834,148:POKE 836,149:POKE 843,150:POKE 845,175  
360 POKE 848,150:POKE 850,174:POKE 853,150:POKE 866,174  
370 PRINT "[6 DOWN]LOADING COMPLETED"
```

The routine works by editing the ASCII representation of the number passed as the USR parameter. The routine assumes that this value has been "integerized" and that the ASCII representation does not contain a decimal point. The position of the decimal point (if any) will be implied by the edit pattern, i.e., the variable ED\$.

If the actual value you wish to format has a decimal point, or if you wish to scale the number to be printed differently from the way it is represented internally in the PET, you can use a BASIC user-defined function to handle the conversion before going to the USR routine. For example:

```

10 DEF FNS2(X) = INT(X*100
+ 0.5)
20 DEF FNPK(X) = INT(X/2.21
+ 0.5)
30 ED$ = "$ , 0.00"
40 Y = USR(FNS2(12.3456))
50 ED$ = "KILOS="
60 PRINT
70 Z = 1000.0 : REM POUNDS
80 Y = USR(FNPK(Z))

```

will cause the following output:

```

$ 12.35
KILOS= 452

```

Listing 2 gives the assembler source code for the PET PRINT USING routine. The appropriate ROM routine locations are given for all three versions of PET BASIC, with conditional assembly determined by the value of ROMs in line 100. The assembled code shown along side of the source code is for BASIC 3.0—the "new" ROMs. The assembler source is almost identical to that shown in Gary Morris' original Applesoft article, with the exception of the use of the STROUT ROM routine to print the formatted representation of the number (line 1450). The assembler source also has several slight differences to accommodate the differences between how Applesoft and PET BASICs handle the ASCII representation of numbers, and the value the USR function returns. The assembler source is well-commented and is very straightforward.

Listing 2

```

0010 ;PRINT USING FOR THE PET
0020 ;BY DAVID MALMBERG
0030 ;43064 VIA MORAGA
0040 ;FREMONT, CALIFORNIA 94536
0050 ;
0060 ;ADAPTED FROM A ROUTINE FOR THE APPLE
0070 ;BY GARY MORRIS IN OCT-1980 MICRO
0080 ;
0090     .BA $033A
0100 ROMS    .DE 3
0110     .DS
0120 STRING   .DE $100
0130 LENGTH   .DE $000
0140 EDITBUF  .DE $001
0150 ;
0160     IFE ROMS-3
0170 FLPASC   .DE $0CE9
0180 STROUT   .DE $CA1C
0190 NAME     .DE $42
0200 VARIABLE .DE $44
0210 FIND     .DE $0FC9
0220 PTRN    .DE $5C
0230 VARTYP  .DE $07
0240 ***

0250 ;
0260     IFE ROMS-4
0270 FLPASC   .DE $0CF93
0280 STROUT   .DE $BB1D
0290 NAME     .DE $42
0300 VARIABLE .DE $44
0310 FINI     .DE $0187
0320 PTRN    .DE $5C
0330 VARTYP  .DE $07
0340 ***

0350 ;
0360     IFE ROMS-2
0370 FLPASC   .DE $0CAF
0380 STROUT   .DE $CA27
0390 NAME     .DE $94
0400 VARIABLE .DE $96
0410 FIND     .DE $0CFD7
0420 PTRN    .DE $AE
0430 VARTYP  .DE $5E
0440 ***

0450 ;
0460 ;FIRST CONVERT NUMBER PASSED BY USR
0470 ;FUNCTION TO FLOATING ACCUM TO
0480 ;ASCII STRING STARTING AT 'STRING'
0490 ;

033A- 20 E9 DC
0500     JSR FLPASC
0510 ;NOW FIND THE VARIABLE (ED$) TO USE
0520 ;IN THE EDIT PATTERN
0530 ;
0540 SEARCH   LDA #1E      ;BASIC VARIABLE
033F- A2 C4 0550 LDX #$C4      ;NAME IS ED$
0341- 85 42 0560 STA *NAME
0343- 86 43 0570 STX *NAME+1
0345- 20 09 CF 0580 JSR FIND
0348- A0 02 0590 LDY #2
034A- B1 44 0600 LDA (VARIABLE),Y      ;GET ADDR HI
034C- 85 5D 0610 STA *PNTR+1
034E- 08 08 0620 DEY
034F- B1 44 0630 LDA (VARIABLE),Y      ;GET ADDR LO
0351- 85 5C 0640 STA *PNTR
0353- 88 08 0650 DEY
0354- B1 44 0660 LDA (VARIABLE),Y      ;GET LENGTH
0356- C9 10 0670 CMP #16
0358- 90 02 0680 BCC LENOK      ;MAXIMUM LENGTH
035A- A9 10 0690 LDA #16      ;ALLOWED IS 16!!!
035C- 8D 20 03 0700 LENOK    STA LENGTH
0710 ;
0720 ;MOVE THE ED$ PATTERN TO EDITBUF
035F- A8 0730 TAY
0360- 88 0740 DEY
0361- B1 5C 0750 LOOP2   LDA (PTRN),Y
0363- 99 21 03 0760 STA EDITBUF,Y
0366- 88 0770 DEY
0367- 10 F8 0780 BPL LOOP2
0790 ;
0800 ;FIND THE ASCII STRING END
0369- A0 00 0910 LDY #0
036B- B9 00 01 0820 LOOPP  LDA STRING,Y      ;GET CHAR

```

```

036E- F0 03    0830      BEQ EDIT
0370- C8        0840      INY
0371- D0 F8        BNE LOOP
0360 ;MOVE STRING TO THE EDITBUF, FROM RIGHT
0370 ;TO LEFT, FILLING OVER NUMBERS BUT
0380 ;SKIPPING COMMA'S AND PERIODS.
0390 ; IF WE COME TO A MINUS SIGN THEN
0380 ;KEEP GOING LEFT UNTIL THE PATTERN
0390 ;HAS A BLANK OR A COMMA, THEN KEEP
0380 ;GOING LEFT STORING BLANKS IN THE
0380 ;EDITBUF UNTIL IT ENDS OR WE COME
0390 ;TO A DOLLAR SIGN
0350 ;
0373- AE 20 03    0960      LDX LENGTH  ;FIELD WIDTH
0370 ;          0970      DEY
0376- 88        0980      EDLOOP
0377- B9 00 01    0990      LDA STRING,Y      ;GET CHARACTER
037A- 48        1000      PHA ;SAVE IT
037B- 68        1010      CHECK
037C- 48        1020
037D- C9 20        1030      CMP #'-      ;IF A MINUS SIGN
037F- D0 0E        1040      BNE DIGIT  ;SKIP TO A BLANK
0381- BD 20 03    1050      MINUS
0384- C9 2D        1060      LDA EDITBUF-1,X
0386- 90 16        1070      CMP #'-      ;IF A MINUS SIGN
0388- CA          1080      BCC DROPIIT
0389- D0 F0        1090      DEX
038B- 68          1100      BNE CHECK
038C- 18          1110      PLA
038D- 90 36        1120      CLC
038F- BD 20 03    1130      BCC DONE
0392- C9 29        1140      LDA EDITBUF-1,X
0394- F0 03        1150      CMP #
0396- C9 2C        1160      BEQ DROPIIT
0398- F0 EE        1170      CMP #10
039A- C9 30        1180      BCC SKIPIT
039C- 90 EA        1190      PLA ;GET IT BACK
039E- 68          1200      STA EDITBUF-1,X
039F- 90 20 03    1210      DEX
03A2- CA          1220      BEQ DONE
03A3- F0 20        1230      CPY #1      ;END OF STRING?
03A5- C0 01        1240      BNE EDLOOP
03A7- D0 C0        1250      INX
03A9- E8          1260      CLC
03AA- 18          1270      BCC NEXT1
03AB- 90 18        1280      LDA EDITBUF-1,X      ;BLANK FROM
03BD- BD 20 03    1290      CMP #$/      ;HERE TO $
03B0- C9 24        1300      BEQ DONE
03B2- F0 11        1310      CMP #
03B4- C9 2E        1320      BCS NEXT1
03B6- B0 05        1330      LDA #
03B8- A9 20        1340      STA EDITBUF-1,X
03BA- 9D 20 03    1350      DEX
03BD- CA          1360      BEQ DONE
03BE- F0 05        1370      CPX LENGTH
03C0- EC 20 03    1380      BCC BLANK
03C3- 90 E8        1390      LDX LENGTH
03C5- AE 20 03    1400      LDA #0
03C8- A9 00        1410      STA EDITBUF,X      ;PUT @ AT END
03CA- 9D 21 03    1420      LDY #H, EDITBUF
03CD- A9 03        1430      LDA #L, EDITBUF
03CF- A9 21        1440      JSR SROUT
03D1- 20 1C CA    1450      LDA #0      ;SET TYPE TO NUMERIC
03D4- A9 00        1460      STA #VARTYP ;TO AVOID BASIC ERROR
03D6- 85 07        1470      RTS
03D8- 60          1480      .EN
03D9- XEND        1490      .EN

```

LABEL FILE: [/ = EXTERNAL]

```

/ROMS=0003      /STRING=0100      /LENGTH=0320
/EDITBUF=0321    /FLPASC=DCE9      /STROUT=CA1C
/NAME=0042      /VARIABLE=0044      /FIND=CFC9
/PNTR=005C      /VARTYP=0007      /SEARCH=033D
LENOK=035C      LOOP2=0361      LOOP=036B
EDIT=0373      EDLOOP=0376      CHECK=037B
MINUS=0381      SKIPIT=0388      DIGIT=038F
DROPIT=039E      BLANK=03AD      NEXT1=03BD
DONE=03C5      XEND=03D9

```

MICRO

Club Circuit

Mike Rowe
Club Circuit
P.O. Box 6502
Chelmsford, MA 01824

The following club announcements are presented in zip code order.

Richmond Computer Club

Gary F. Cowardin is Treasurer for this group which meets on the last Monday of each month at 7:30 pm at the Science Museum of VA. This club has a membership of over 50 active members who meet to encourage organized computer use involving Ohio Scientific, Heath, TRS-80, Apple, and many other microcomputers. For further information, write:

Secretary
1004 Lorraine Avenue
Richmond, VA 23227

Jacksonville Atari & PET Society (JAPS)

This group meets at various member's homes and businesses to assist members, exchange ideas, information and experiences. Russell A. Grokett, Jr is president for this newly-formed group. For monthly information on club meeting locations contact the president at (904) 725-0435 evenings and weekends. Or write to:

401 Monument Road #171
Jacksonville, FL 32211

6502 User's Group

Chairman Gerald Key heads this group of 28+ members which meets every 3rd Thursday of the month at 7:30 pm. Meetings are held at the State Savings Bank Community Room, 444 Havens Corner Road, Gahanna, OH. This club states its purpose as a means to exchange ideas, provide assistance to members, and promote the use of microcomputers. This club provides a forum for all 6502-based users and is the only Columbus area alternative to many Apple user's groups. For further information, write:

Chairman
141 Flintridge Drive
Gahanna, OH 43230

(Continued on page 20)

80 COLUMN GRAPHICS



The image on the screen was created by the program below.

```
10 VISMEN: CLEAR
20 P=1:0: Q=100
30 XP=145: XR=1.5*3.1415927
40 YP=55: YR=1: ZP=64
50 XF=XR:XP: YPA=YPYR: ZP=XR/ZP
60 ZP=ZI: ZI=0: T=0: Q=1
70 IF X=Z OR Y>ZP GOTO 150
80 ZP=ZI: ZI=ZP: Z=ZI
90 XL=INT(.5*(SIN(XP)*PA*T+PI))
100 FOR XI=-XL TO XL
110 XT=SQR(XI*XI+ZI*ZI)*XP: XX=XI
120 YY=(SIN(XT)+.4*SIN(3*XT))/XP
130 GOSUB 170
140 NEXT XI
150 NEXT ZI
160 STOP
170 X1=XX+ZI*P
180 Y1=YY-ZI*Q
190 GMODE 1: NOVE X1,Y1: WRPIX
200 IF Y1=0 GOTO 210
210 GMODE 2: LINE X1,Y1-1,X1,0
220 RETURN
```

The Integrated Visible Memory for the PET has now been redesigned for the new 12" screen 80 column and forthcoming 40 column PET computers from Commodore. Like earlier MTU units, the new K-1008-43 package mounts inside the PET case for total protection. To make the power and flexibility of the 320 by 200

bit mapped pixel graphics display easily accessible, we have designed the Keyword Graphic Program. This adds 45 graphics commands to Commodore BASIC. If you have been waiting for easy to use, high resolution graphics for your PET, isn't it time you called MTU?

K-1008-43M Manual only \$10 (credited toward purchase)
k-1008-43 Complete ready to install package \$495

Mastercharge and Visa accepted

Write or call today for our full line catalog describing all MTU 6502 products, including our high speed 8" Floppy Disk Controller for up to 4 megabytes of PET storage.



NOW 80 COLUMN PET'S CAN HAVE MTU HIGH RESOLUTION GRAPHICS

MEMSEARCH

for the AIM 65

"MEMSEARCH" is a machine language utility program which quickly scans through memory searching for a user-specified sequence. It can assist in locating an ASCII string or an instruction code group. A wild card feature allows for partial matching of sequences up to 16 bytes long.

Bob Kovacs
41 Ralph Road
West Orange, New Jersey 07052

Have you ever had to manually search through memory to look for a certain sequence? Whether you're searching for a particular series of op-codes or ASCII text, doing it with the help of a dump utility or even a disassembler can be painfully slow and prone to error. Clearly this is another job for the computer! The machine language routine described here will accept up to a 16-byte sequence (easily increased if that isn't enough) and identify the starting locations of any matching sequences within the memory range specified by the user.

Although this program was specifically written for use on the AIM 65, using existing monitor routines whenever possible, it shouldn't be too difficult to adapt it to any other 65XX system.

The Program

The flow diagram in figure 1 defines the major events and decision points in memory search routine. Entry point labels are also included to relate these functions to the implementation (see program listing in figure 2).

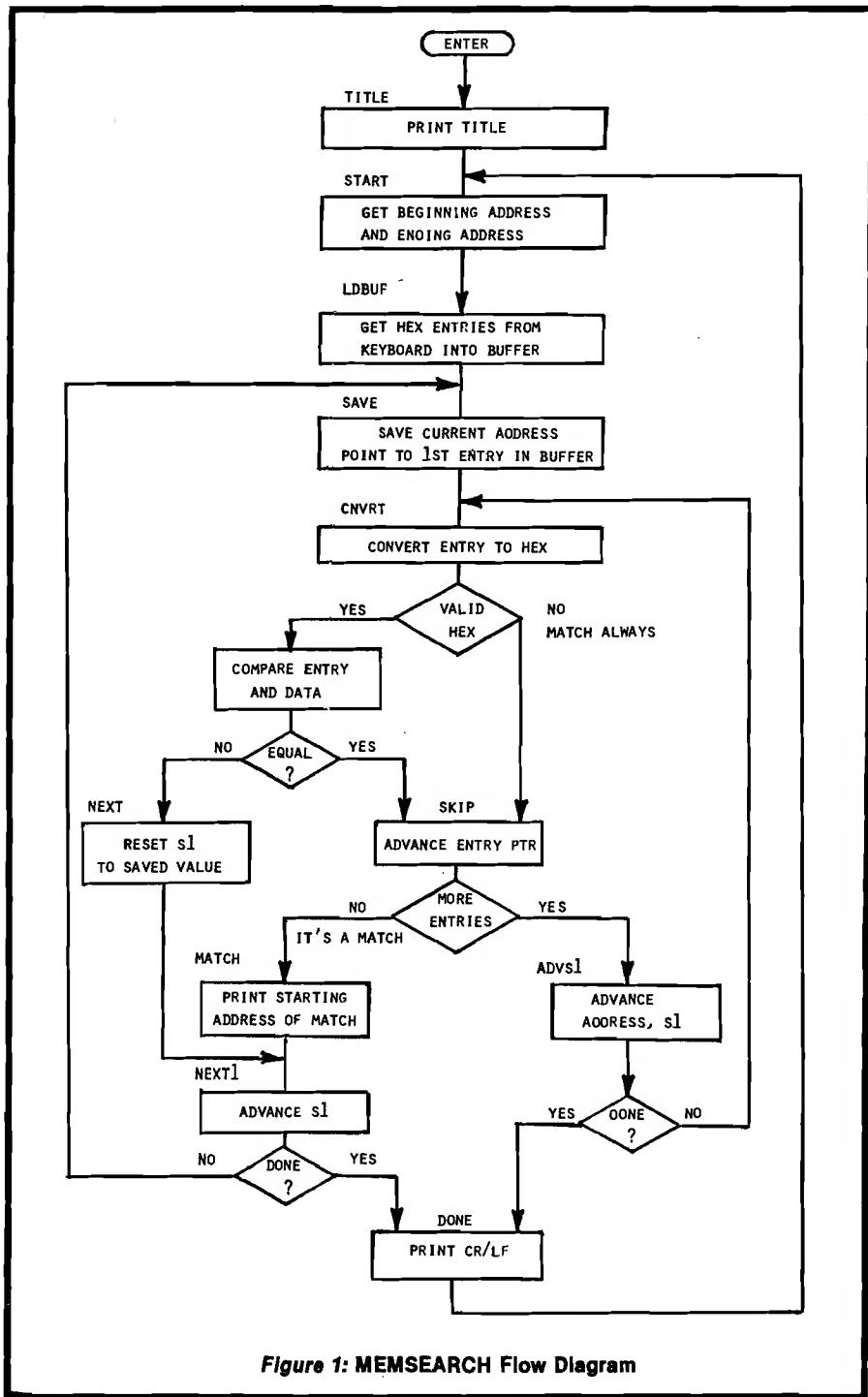


Figure 1: MEMSEARCH Flow Diagram

The program begins by establishing a memory search range and the data sequence to be found. This sequence is stored in a buffer using keyboard entry format (2 ASCII bytes per hex byte entry) and is converted to its numerical equivalent each time it is compared to memory. Although this approach is not terribly efficient, it was necessary in order to allow for wild card or don't-care entries, and still permit all 256 possible byte values for valid comparisons. I'm sure that other approaches could have been used to speed up execution time somewhat, but this method is still fairly fast. The worst case of a search through 4K of memory (when all but the 16th entry always match) takes about 6 seconds to complete.

The main body of the program operates by comparing the entry sequence to the data within the memory bounds specified by the user. This is performed one byte at a time, starting with the first entry and then searching for a corresponding value in memory. If a match is found, then the second entry is compared to the contents of the next memory location only. This operation is repeated, always comparing the next entry with the data in the next memory location. If successive successful comparisons exhaust the total number of entries in the buffer, then the entire entry sequence has been matched. At this point the memory address corresponding to the first entry is output, and the search continues at the memory location following the matched sequence.

If at any point an entry fails to match the contents of memory, then the starting address corresponding to the first entry is incremented by one, and the entire operation begins again.

A number of monitor routines were used in MEMSEARCH to minimize its length (192 bytes program and 36 bytes variable space). A summary of the monitor routines used here is shown in figure 3. Along with the name and entry point is a brief description of what the routine does. Those registers affected by that call to the monitor are also listed.

Figure 2

```

0800      1 ;  

0800      2 ;  

0800      3 ;  

0800      4 ;  

0800      5 ;MEMSEARCH FOR AIM 65  

0800      6 ; BY BOB KOVACS  

0800      7 ; 41 RALPH ROAD  

0800      8 ; WEST ORANGE, NJ 07052  

0800      9 ;  

0800     10 ;ALL KEYBOARD ENTRIES  

0800     11 ; IN HEXADECIMAL  

0800     12 ;NONHEX ENTRIES--"DON'T CARE"  

0800     13 ;  

0800     14 ;ALL MATCHES RETURN BEGINNING  

0800     15 ; ADDRESS OF SEQUENCE  

0800     16 ;  

0400     17     ORG $400  

0400     18     OBJ $800  

0400     19     FROM EQU $E7A3  

0400     20     TO   EQU $E7A7  

0400     21     MOVE  EQU $F910  

0400     22     LDAY  EQU $EB58  

0400     23     PACK   EQU $EA84  

0400     24     NUMA  EQU $EA46  

0400     25     OUTPUT EQU $E97A  

0400     26     REDOUT EQU $E973  

0400     27     BLANK  EQU $E83E  

0400     28     CRLF   EQU $E9F0  

0400     29     QM    EQU $E7D4  

0400     30     STIY   EQU $A427  

0400     31     ADDR   EQU $A41C  

0400     32     S1    EQU $A41A  

0400     33 ;  

0400     34 ;  

0400     35 ;OUTPUT TITLE  

0400 A000 36 TITLE LDY #$00  

0402 B9BD04 37 TITLE1 LDA MSG,Y  

0405 F006 38 BEQ TITLE2  

0407 207AE9 39 JSR OUTPUT  

040A C8 40 INY  

040B D0F5 41 BNE TITLE1  

040D 20F0E9 42 TITLE2 JSR CRLF  

0410 43 ;  

0410 44 ;GET BEGINNING & ENDING ADDRESSES  

0410 20A3E7 45 START JSR FROM  

0413 B0FB 46 BCS START  

0415 203EE8 47 JSR BLANK  

0418 2010F9 48 JSR MOVE  

041B 20A7E7 49 START1 JSR TO  

041E B0FB 50 BCS START1  

0420 51 ;  

0420 52 ;PROMPT USER FOR HEX INPUT  

0420 20D4E7 53 LDBUF JSR QM  

0423 203EE8 54 JSR BLANK  

0426 A200 55 LDX #$00  

0428 56 ;  

0428 57 ;GET ENTRY PAIRS & STORE IN BUF  

0428 58 ;EXIT ENTRY MODE WITH CR  

0428 2073E9 59 LDBUF1 JSR REDOUT  

042B C90D 60 CMP #$0D  

042D F011 61 BEQ LDBUF2  

042F 9DCA04 62 STA BUFHI,X  

0432 2073E9 63 JSR REDOUT  

0435 9DDA04 64 STA BUFLO,X  

0438 203EE8 65 JSR BLANK  

043B E8 66 INX  

043C E010 67 CPX #$10  

043E 90E8 68 BCC LDBUF1

```

```

0440 8EC904   69  LDBUF2 STX ENTCNT
0443 20F0E9   70  JSR CRLF
0446          71  ;
0446          72  ;SAVE CURRENT ADDRESS
0446 AD1AA4   73  SAVE LDA S1
0449 8DC704   74  STA TEMP1
044C AD1BA4   75  LDA S1+1
044F 8DC804   76  STA TEMP2
0452          77  ;
0452          78  ;READ BUF & CONVERT TO HEX
0452          79  ;NON-HEX ACTS AS DON'T CARE
0452 A200     80  LDX #$00
0454 BDCA04   81  CNVRT LDA BUFHI,X
0457 2084EA   82  JSR PACK
045A B014     83  BCS SKIP
045C BDDA04   84  LDA BUFL0,X
045F 2084EA   85  JSR PACK
0462 B00C     86  BCS SKIP
0464          87  ;
0464          88  ;COMPARE TO DATA AT ACTIVE ADDRESS
0464 A000     89  LDY #$00
0466 A91A     90  LDA #$1A
0468 2058EB   91  JSR LDAY
046B CD29A4   92  CMP STIY+2
046E D01E     93  BNE NEXT
0470          94  ;
0470          95  ;MATCH OR DON'T CARE
0470 E8       96  SKIP INX
0471 ECC904   97  CPX ENTCNT
0474 B007     98  BCS MATCH
0476 20A804   99  JSR ADVS1
0479 B027    100  BCS DONE
047B 90D7    101  BCC CNVRT
047D          102  ;
047D          103  ;GOT A MATCH!
047D          104  ;OUT SAVED ADDRESS
047D ADC804   105  MATCH LDA TEMP2
0480 2046EA   106  JSR NUMA
0483 ADC704   107  LDA TEMP1
0486 2046EA   108  JSR NUMA
0489 203EE8   109  JSR BLANK
048C D00C     110  BNE NEXT1
048E          111  ;
048E          112  ;NO OR PARTIAL MATCH
048E          113  ;BACK-UP ACTIVE ADDRESS
048E ADC704   114  NEXT LDA TEMP1
0491 8D1AA4   115  STA S1
0494 ADC804   116  LDA TEMP2
0497 8D1BA4   117  STA S1+1
049A 20A804   118  NEXT1 JSR ADVS1
049D B003     119  BCS DONE
049F 4C4604   120  JMP SAVE
04A2          121  ;
04A2          122  ;NO MORE DATA--START AGAIN
04A2 20F0E9   123  DONE JSR CRLF
04A5 4C1004   124  JMP START
04A8          125  ;
04A8          126  ;COMPARE & BUMP ADDRESS PTR
04A8 AD1AA4   127  ADVS1 LDA S1
04AB CD1CA4   128  CMP ADDR
04AE AD1BA4   129  LDA S1+1
04B1 ED1DA4   130  SBC ADDR+1
04B4 EE1AA4   131  INC S1
04B7 D003     132  BNE ADV
04B9 EE1BA4   133  INC S1+1
04BC 60       134  ADV RTS
04BD          135  ;
04BD          136  ;

```

(continued)

Using the Program

Load MEMSEARCH through the assembler using the listing in figure 2. Save the program on tape using the 'DUMP TO TAPE' command from \$400 to \$4BF.

After loading MEMSEARCH, begin its execution using the '*' and 'G' commands. The beginning address and ending address + 1 are entered in response to the 'FROM' and 'TO' prompts. The sequence to be found is entered following the '?' prompt. Values are in hex notation without spaces between bytes (spaces are automatically inserted). Two characters must be entered per byte, and up to 16 bytes can be specified. Non-hex entries act as wild cards and match anything. Terminate the sequence (if less than 16 bytes) with a carriage return. The addresses of any matching data sequences in memory are output and the program loops back to search a new memory block.

Applications

What can MEMSEARCH be used for? Well, everyone has his own needs. I was prompted to write MEMSEARCH in order to locate certain entry points and page zero usage in the AIM 65 BASIC interpreter. Unfortunately Rockwell hasn't provided much information in this area. Nevertheless, I suspected that this was a version of Microsoft BASIC similar to the one known as Applesoft (used in the Apple II). Although quite a bit is known about Applesoft, the memory locations used in the Apple and AIM weren't necessarily the same. Thus the code wouldn't be the same (hence the need for a wild card). With the help of MEMSEARCH I was able to identify the required entry points and page zero locations in a minimum of time.

Bob Kovacs is an electro-optics engineer at Bendix where he is currently responsible for the development of a charge-transfer imaging system used for celestial navigation. He is using an AIM 65 for imager sequencing, data collection and processing in the evaluation of a breadboard system. At home, Bob is involved with hardware/software projects on his Apple II. He also enjoys skiing, gardening and photography.

MICRO Club Circuit

(Continued from page 15)

Apple PI Computer User's Group

Rod Nelson, President, William T. Davis Secretary preside over this club boasting a membership of 276. Meetings are held on the first Thursday of each month at 7:00 pm, at the Colorado School of Mines, Golden, CO. The group meets to help each other learn and enjoy computing with Apples.

Contact:

Secretary
P.O. Box 17467
Denver, CO 80217

Las Cruces Computer Club

This dual Apple/TRS-80 users group meets on the first Thursday of each month at 7:30 pm at the SW Computer Center (121 Wyatt Suite 7, Las Cruces, NM 88001). Leonard Fetterhoff is club president for 25 members. For further information contact the club secretary:

John Martellaro
2929 Los Amigos Ct. Apt. B
Las Cruces, NM 88001

Original Apple Corps

Kip J. Reiner is president for this club of 300 members. Meetings are held on the second Sunday of the month at noon at UCLA campus, Young Hall, Room 2224, Los Angeles, CA. This group publishes a club magazine, "Applesauce" for \$15.00 a year. They meet to expand the knowledge of Apple computers, hardware and software. For further information, write:

Secretary
19041-2 Hamlin Street
Reseda, CA 91335

Apple-Can

This 200+ membership club meets at 7:30 on the first Wednesday of each month, currently at Forest Hill Public Library. Louis H. Milrad is the club president. This club features many guest speakers and promotes the better understanding of the Apple computer, its applications and limitations. They publish a bimonthly newsletter. Many active subgroups in Telecommunications, Medical, Pascal, Forth, Introduction to BASIC, Games, Business, etc, all with an extensive program library. For further information, contact:

Secretary
Suite 204
2 Gloucester Street
Toronto, Ontario, CANADA
M4Y 1L5

```

04BD 4D454D 137 MSG      ASC 'MEMSEARCH'
04C0 534541
04C3 524348
04C6 00      138      BYT $00
04C7 00      139 TEMP1   BYT $00
04C8 00      140 TEMP2   BYT $00
04C9 00      141 ENTCNT  BYT $00
04CA 313233 142 BUFHI   ASC '12345678'
04CD 343536
04D0 3738
04D2 313233 143      ASC '12345678'
04D5 343536
04D8 3738
04DA 313233 144 BUFL0   ASC '12345678'
04DD 343536
04E0 3738
04E2 313233 145      ASC '12345678'
04E5 343536
04E8 3738

```

| Name | Address | Registers Changed | Description |
|--------|---------|-------------------|--|
| FROM | E7A3 | A,X,Y | Output 'FROM' prompt; user inputs 4 character hex address (ESC & DEL are active) which is stored @ADDR. Carry set if non-hex value entered. |
| TO | E7A7 | A,X,Y | Same as FROM except for prompt. |
| REDOUT | E973 | A | Return with a single character from keyboard in accumulator. Echo to output device unless CR input. |
| MOVE | F910 | A,X | 2-byte move from ADDR to S1. |
| LDAY | EB58 | A | Performs a LDA (S1),Y without using page zero. Enter with accumulator pointing to S1 via offset from \$A400 base address. |
| PACK | EA84 | — | Converts ASCII character in accumulator into hex and packs it with previous value (saved in STIY + 2). If not hex (i.e. 0-9,A-F) then original character is returned with carry set. |
| NUMA | EA46 | — | Output contents of accumulator as 2 character hex. |
| OUTPUT | E97A | — | Output ASCII code in accumulator to active output device(s). |
| BLANK | E83E | A | Output a single space. |
| CRLF | E9F0 | A | Output a carriage return and line feed. |
| QM | E7D4 | A | Output a question mark. |

Figure 3: AIM 65 Monitor Routine Summary

MICRO

ASCII EXPRESS II

by BILL BLUE

Described in INFOWORLD as "The finest program for Apple data communications . . ." ASCII EXPRESS II allows your Apple to communicate with virtually any computer with dial-up access.

Written in Applesoft and Machine language, Ascii Express II includes everything you'd expect in a complete communications package. It features a variety of powerful features including full support of upper/lower case, autodial and answer capabilities (when used with the Hayes Micromodem), and file oriented upload/download facilities.

A built-in line editor gives full editing functions, and programmable keyboard MACROS reduce complicated log-in procedures to a few simple keystrokes.

Downloaded files may be printed while being received, saved to disk, or printed later when offline. The copy mode allows everything shown on the screen to be saved in the large (20K) buffer.

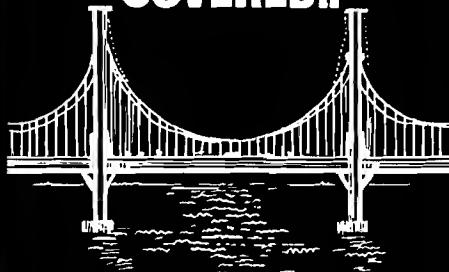
Ascii Express II works with the Hayes Micromodem II, Apple communications card, the CCS Asynchronous Serial card, SSM-AIO Board, Lynx Telephone Linkage System, and many other communications devices.

Uses include:

- Send/receive letters/files from networks like the SOURCE, MICRONET, or other bulletin board type systems.
- Transferring program files between Apples, an Apple and a TRS-80, PET, etc.
- Use the Apple as a terminal to a mainframe at a remote location with the added advantage of being able to process data at the Apple before or after transfer.
- Minimize on-line costs by quickly transferring files and other data.

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*Note: CP/M and Apple DOS files are not directly compatible.

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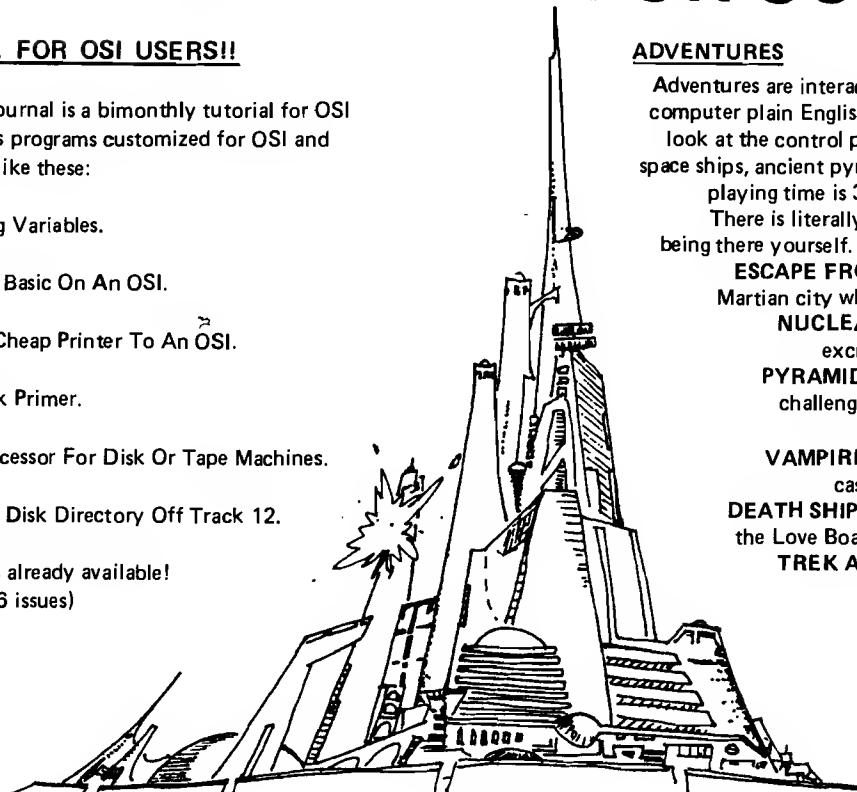
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Joysticks for the OSI C4

You can do better than to buy
OSI joysticks for the C4P. Here's
how to make and test your own.

Charles Platt
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New York, New York 10011

The Ohio Scientific Challenger C4 is designed for use with joysticks, which are available from the manufacturer as an optional extra. Anyone who really enjoys playing and/or programming video games will want to take advantage of this feature, since it is much easier to control a game with joysticks than by pressing keys on the keyboard. However, Ohio Scientific joysticks are expensive, not as strong as one would like, and often out of stock at one's local OSI dealer. Having learned these hard facts of life, I decided to take matters into my own hands. Either I would convert Atari joysticks (which are very widely available and not too highly priced), or I would make my own.

Joystick Operation

During a game program the computer needs to know in which direction each joystick is being pushed by the player(s), and whether the "action key" on each joystick is being pressed.

Inside the joystick assembly are four switches which close, one at a time, when the stick is pushed up, down, left, or right. If the stick is pushed diagonally, two of the four switches close simultaneously. In addition there is a fifth switch which is closed when the player pushes the action key.

The computer detects these switch closures via a POKE command in the game program. For example, POKE 57088,128 directs the computer's attention to Joystick A. If the program next asks for a PEEK c memory location 57088, this will yield a number which corresponds to which switches are closed inside the joystick assembly.

This routine is similar to a keyboard PEEK routine, and the joysticks can be thought of as extensions to the keyboard.

There is a chart on page 90 of the old C4 user's manual, giving the possible PEEK numbers and the joystick positions which they represent. Unfortunately, the column headings in this chart are incorrect. The figures in the columns headed "Action Key Depressed" are in fact produced when the action key is not depressed, while the figures in the "Action Key Not Depressed" column are in fact produced when the action key is depressed. If you write your own game program it is important to bear this in mind. This has been corrected in the 1981 version of the C4P User's Manual.

Connecting Non-C4 Joysticks

There are four trapezoidal sockets on the back panel of the C4, adjacent to the fan. The top socket is for Joystick A, the next one down is for Joystick B. (The other two sockets are for keypads A and B.)

Neither the C4 user's manual nor the maintenance manual gives precise information about which pin does what, in the joystick sockets. However, some trial-and-error tests revealed the functions that follow.

Looking at the outside of the socket, numbering the pins from left to right, the top row of pins in each socket can be labelled pins 1 through 5, and the bottom row, pins 6 through 9. In this case, pin 1 is the ground, pin 2 connects to the action key, pin 3 connects to the "Left" switch in the joystick, pin 4 goes to the "Down" switch, pin 5 to the "Right" switch, and pin 6 to the "Up" switch. Pins 7, 8, and 9 are unconnected.

My first experiment was with Atari joysticks. By a rare fluke of standardization in the computer industry, the

Atari joystick plug exactly fits the C4 joystick socket. Moreover, the switching inside the Atari joystick unit is similar to the switching of C4 joysticks, and there are precisely six wires in the Atari connecting cable—just right for the six active pins in the C4 socket.

There is one snag however. If you look in the holes in the Atari plug, you will find that not all of them contain metal connectors. Some holes are not used and do not connect to anything. Unfortunately, these holes correspond with pins in the C4 socket which are used and must be connected to something. So you have to slice open the molded plastic Atari plug to get at the metal connectors, which must be reshuffled into the right sequence, leaving holes 7, 8, and 9 empty to correspond with unused C4 pins 7, 8, and 9.

The Atari wires are color coded and should be matched to the C4's pin numbers as follows:

| | |
|--------|-------|
| Black | Pin 1 |
| Orange | Pin 2 |
| Green | Pin 3 |
| Blue | Pin 4 |
| Brown | Pin 5 |
| White | Pin 6 |

Once you have opened the plug and extracted the little metal connectors which slide onto the pins in the joystick socket (some connectors may be torn loose in the plug-opening operation and will need to be resoldered to their wires), you can slide these connectors individually onto their separate pins, and separate them with small pieces of electrical tape to prevent accidental shorts. You can then test the joystick, using the procedure described later in this article.

When you're sure the joystick is working properly, and all your connections have been made correctly, you can drip some quick-setting epoxy over the metal connectors to encapsulate

them. When the epoxy is dry, the connectors can be slipped off the pins in one unit. The epoxy has, in fact, created a new "plug" around the connectors, to replace the original plug which had to be sliced open.

Making Your Own Joysticks

After using Atari joysticks for a while, I became dissatisfied with their response and decided to build my own. This turned out to be extremely simple.

Each joystick unit consists of a box with a wooden top and bottom and aluminum sides. (The thin aluminum is bent around the wood and nailed to it.) The stick is pivoted where it is screwed to the bottom of the box; some self-centering action is provided by a small compression spring. The stick protrudes through a 1" square hole in the top of the box. Arranged around this hole, screwed to the underside of the top of the box, are four microswitches, positioned so that their contact buttons are just touching the four sides of the stick (which has a square cross-section at this point). Lastly, a pushbutton is mounted on the outside of the top of the box to serve as the action key.

Using microswitches allows a much more positive "feel" than is available from the Atari joysticks. My homemade units provide much more precise control of video games.

Checking Joystick Operation

To make sure you have wired your home-made or Atari joysticks correctly, you can run a simple "POKE and PEEK" test program.

Program for Joystick A

```

10 POKE 2073,96:REM —
    DISABLES CONTROL-C.
    THE ROUTINE WON'T
    FUNCTION TILL YOU DO
    THIS.
20 FOR K = 1 TO 200:REM —
    SEE NOTE BELOW
30 POKE 57088,128:REM —
    ACTIVATES JOYSTICK A
40 P=PEEK(57088) AND
    31:REM — PEEK JOYSTICK A
50 PRINT P
60 FOR D = 1 TO 200:NEXT
    D:REM — DELAY LOOP
70 NEXT K
80 END

```

Since "Control-C" has been disabled in the program, there is no way of stopping the program once it has started, short of hitting the Break key. So a loop is used, incrementing K by 1 in each of 200 cycles. The program ends at the end of the loop. A delay loop is also used, to stop the figures from racing uncontrollably across the screen.

Note: line 30, the POKE command, is inside the K loop. This is because you must POKE 57088 again after each time you have PEEKed it and it has yielded data. If you write a program which repeatedly PEEKs 57088 for data and does not re-POKE it each time, you will find that the joysticks won't work properly. For a demonstration of this fault, you can run the sample program listed on page 93 of the old C4 user's manual, or pages 45-47 in the new manual. This program erroneously fails to POKE 57088 after PEEKing it. Consequently, as listed, the program doesn't work.

When you test Joystick A, using the test program shown here, you should find that moving the stick generates, on the video screen, the various numbers listed on page 90 of the old manual, page 43 in the new manual. If the numbers are as listed, but they appear in the wrong sequence, you've probably made an incorrect connection in the joystick socket. If the numbers on the screen do not in any way match the numbers in the manual, you have probably made a programming error. Be sure that your PEEK command is PEEK(57088) AND 31. Without the "AND 31" it won't work.

If you are using Atari joysticks and you find that pushing the stick directly up and down, or from side to side, produces numbers which wrongly indicate diagonal motion, the problem is simply that you are pushing the stick too hard, thus turning on two switches instead of only one at a time. Only very light pressure is required.

Once you have tested Joystick A, you can test Joystick B by rewriting two lines of the test program:

```

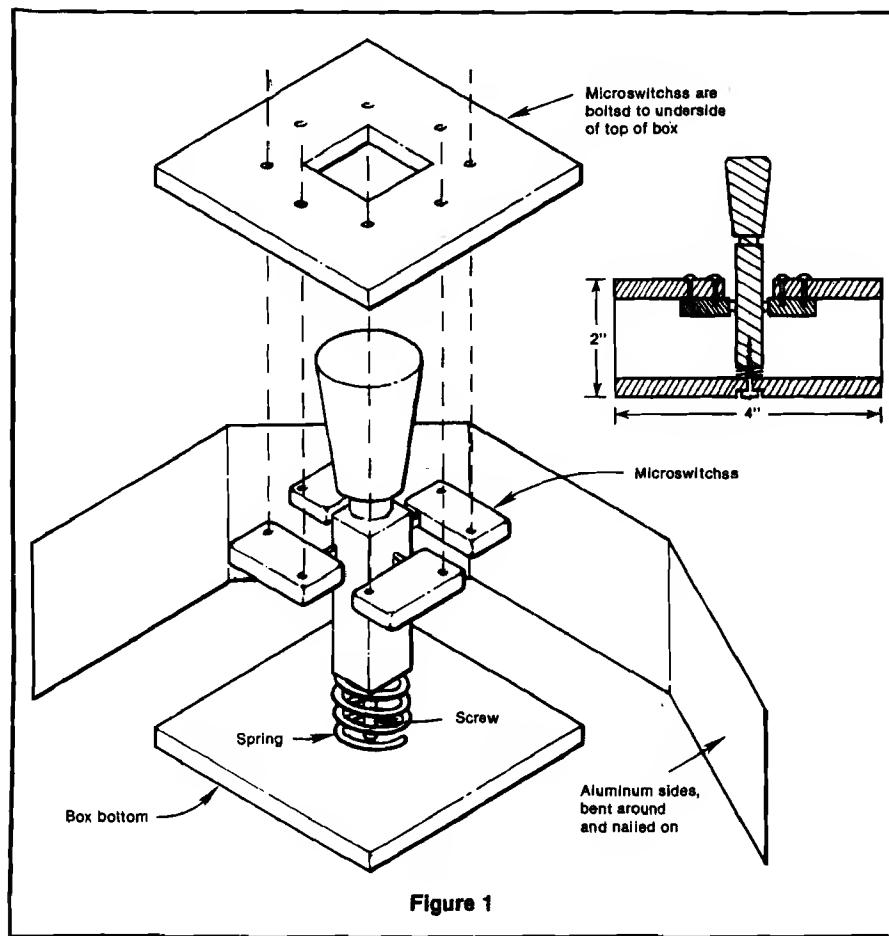
30 POKE 57088,16
40 P=PEEK(57088) AND 248

```

These are the POKE and PEEK which give access to Joystick B.

Happy game playing!

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- A. It makes using the Comm. Card almost as easy as using the Micromodem II.
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- A. No. DATA CAPTURE 4.0 gives you control of the text buffer. You can use DATA CAPTURE 4.0 to create text.
- Q. Can I edit the text I have prepared?**
- A. Yes. You can insert lines or delete any lines from the text.
- Q. How about text I have captured. Can I edit that?**
- A. As easily as the text you have prepared yourself. You can delete any lines you don't want to print or save to a disk file. You can also insert lines into the text.
- Q. Just how much text can I capture with DATA CAPTURE 4.0?**
- A. If the system with which you are communicating accepts a stop character, most use a Control S, you can capture an unlimited amount of text.
- Q. How does that work? And do I have to keep an eye on how much I have already captured?**
- A. When the text buffer is full the stop character is output to the other system. Then DATA CAPTURE 4.0 writes what has been captured up to that point to a disk file. This is done automatically.
- Q. Then what happens?**
- A. Control is returned to you and you can send the start character to the other system. This generally requires pressing any key, the RETURN key or a Control Q.
- Q. Are upper and lower case supported if I have a Lower Case Adapter?**
- A. Yes. If you don't have the adapter an upper case only version is also provided on the diskette.
- Q. Do I need to have my printer card or Micromodem IITM or Communications CardTM in any special slot?**
- A. No. All this is taken care of when you first run a short program to configure DATA CAPTURE 4.0 to your system. Then you don't have to be concerned with it again. If you move your cards around later you can reconfigure DATA CAPTURE 4.0.
- Q. Do I have to build a file on the other system to get it sent to my Apple?**
- A. No. If the other system can list it you can capture it.
- Q. How easy is it to transmit text or data to another system?**
- A. You can load the text or data into DATA CAPTURE 4.0 from the disk and transmit it. Or you can transmit what you have typed into DATA CAPTURE 4.0.
- Q. How can I be sure the other system receives what I send it?**
- A. If the other system works in Full Duplex, it 'echoes' what you send it, then DATA CAPTURE 4.0 adjusts its sending speed to the other system and won't send the next character until it is sure the present one has been received. We call that 'Dynamic Sending Speed Adjustment'.
- Q. What if the other system works only in Half Duplex?**
- A. A different sending routine is provided for use with Half Duplex systems.
- Q. What if I want to transmit a program to the other system?**
- A. No problem. You make the program into a text file with a program that is provided with DATA CAPTURE 4.0, load it into DATA CAPTURE 4.0 and transmit it.
- Q. What type files can I read and save with DATA CAPTURE 4.0?**
- A. Any Apple DOS sequential text file. You can create and edit EXEC files, send or receive VISCIALCTM data files, send or receive text files created with any editor that uses text files.
- Q. Can I leave DATA CAPTURE 4.0 running on my Apple at home and use it from another system?**
- A. Yes. If you are using the Micromodem IITM you can call DATA CAPTURE 4.0 from another system. This is handy if you are at work and want to transmit something to your unattended Apple at home.
- Q. Where can I buy DATA CAPTURE 4.0?**
- A. Your local Apple dealer. If he doesn't have it ask him to order it. Or if you can't wait order it directly from Southeastern Software. The price is \$65.00. To order the Dan Paymar Lower Case Adapter add \$64.95 and include the serial number of your Apple.
- Q. If I order it directly how can I pay for it?**
- A. We accept Master Charge, Visa or your personal check. You will get your order shipped within 3 working days of when we receive it no matter how you pay for it. Send your order to us at the address shown or call either of the numbers in this advertisement. You can call anytime of day, evening or Saturdays.
- Q. I bought DATA CAPTURE 3.0 and DATA CAPTURE 4.0 sounds so good I want this version. What do I do to upgrade?**
- A. Send us your original DATA CAPTURE 3.0 diskette and documentation, the \$35.00 price difference and \$2.50 for postage and handling. We will send you DATA CAPTURE 4.0 within 3 working days of receiving your order.
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Apple Memory Maps, Part 1

Your Apple can draw accurate memory maps of integer BASIC and Applesoft programs, together with their associated variables, arrays, and strings, by using the information contained in various pointers. DOS, MAXFILES, and RAM Applesoft can also be displayed.

Peter A. Cook
1443 N. 24th Street
Mesa, Arizona 85203

This article will be presented in two parts. Part 1 contains examples of memory maps produced by the Apple, which show where the computer stores programs in its memory. Part 2 will contain the "Memory Map" program listing and a description of how it works.

Memory maps show where computers store data in their memories. A 48K Apple actually has 65,536, or 64K, memory locations in which data can be stored. Locations 0 to 49151, the first 48K, are available for storing changeable information (Random Access Memory), while locations 49152 to 65535, the last 16K, are for permanently-installed data which can't be changed by the user (Read Only Memory). The computer places data into specific locations in the RAM memory area, depending on what type data it is, and which language is being used.

Various charts in the Apple reference manuals show where programs are stored in RAM, along with their associated variables, arrays and strings. The disk and cassette versions of Applesoft are also stored in this area, and so is the Disk Operating System and its file buffers. The charts are adequate for simple programs, but for more complex ones you need to know exactly how much space is used by the different program components. This is especially important if the Hi-Res graphics pages are used, or if machine language subroutines are included.

| APPLE II | Applesoft Card | | NO CARD |
|-----------|----------------|--------------------------|--------------------------|
| | Switch up | Switch down | |
| DOS 'INT' | Integer BASIC | Integer BASIC | Integer BASIC |
| DOS 'FP' | ROM Applesoft | ROM Applesoft | RAM Applesoft (disk) |
| no DOS | ROM Applesoft | Integer BASIC | Integer BASIC |
| | | RAM Applesoft (cassette) | RAM Applesoft (cassette) |

Figure 1: Language availability for various configurations of the Apple II.

Description

The following maps cover the Apple's RAM memory area from 2048 to the highest available RAM location in your machine. The area from 0 to 2047 is not included because it is used by the computer for various internal functions and is not generally available for BASIC programs.

The MEMORY MAP program will provide the following information:

1. Maximum amount of RAM available.
2. Whether or not DOS has been booted.
3. Number of DOS file buffers reserved [MAXFILES].
4. Current language in use.
5. Whether or not a program has been loaded, or run.
6. Location and length of program, variables, arrays, and strings.
7. Amount of free space remaining.
8. Setting of LOMEM and HIMEM.
9. Location of Hi-Res graphics pages.
10. Extent of the "garbage collection" of old strings.

The program will work with all versions of the Apple II or Apple II Plus, ranging in size from 16K to 48K, with either the old monitor ROM or the new autostart ROM installed. It will accept programs from cassette as well as disk, but it will only work with DOS version 3.2.

The program was designed for use with Integer BASIC, RAM Applesoft, or ROM Applesoft. However, I do not know what the results will be if you use these languages with the Pascal language system installed. Language availability for various configurations of the Apple II is shown in figure 1.

Integer BASIC Memory Maps

The following examples show how the MEMORY MAP program can be used with Integer BASIC programs. We will use a 48K Apple II with Applesoft card in slot 0, printer in slot 2, and disk drive in slot 6. For the first example, turn on the computer without loading DOS. Enter the monitor and load the

MEMORY MAP: INTEGER BASIC

| | | | | |
|--------|------------|----|-------|--------|
| | | HM | 49152 | \$0000 |
| HIRES | | | | |
| 24576 | | | | |
| \$6000 | FREE SPACE | | 47104 | \$B800 |
| 16384 | | | | |
| \$4000 | | | | |
| 8192 | | | | |
| \$2000 | | | | |
| | | LM | 2048 | \$0800 |
| | | | | |

Figure 2: Integer BASIC map with nothing in memory.

MEMORY MAP: INTEGER BASIC

| | | | | |
|--------|------------|----|-------|--------|
| | | HM | 49152 | \$0000 |
| HIRES | | | | |
| 24576 | | | | |
| \$6000 | FREE SPACE | | 47098 | \$B7FA |
| 16384 | | | | |
| \$4000 | | | | |
| 8192 | | | 2054 | \$0806 |
| \$2000 | VARIABLES | | | |
| | ARRAYS | | | |
| | STRINGS | | | |
| | | LM | 2048 | \$0800 |
| | | | | |

Figure 3: Integer BASIC map showing area for variables.

MEMORY MAP: INTEGER BASIC

| | | | |
|---------|------------|-------|--------|
| | HM | 49152 | \$0000 |
| PROGRAM | | 49138 | \$BFF2 |
| | | | |
| HIRES | | | |
| 24576 | | | |
| \$6000 | FREE SPACE | 47090 | \$B7F2 |
| 16384 | | | |
| \$4000 | | | |
| 8192 | | | |
| \$2000 | | | |
| | | | |
| | LH | 2048 | \$0800 |

Figure 4: Integer BASIC map showing program area.

MEMORY MAP: INTEGER BASIC

| | | | |
|---------|------------|-------|--------|
| | HM | 49152 | \$0000 |
| PROGRAM | | 49138 | \$BFF2 |
| | | | |
| HIRES | | | |
| 24576 | | | |
| \$6000 | FREE SPACE | 47084 | \$B7EC |
| 16384 | | | |
| \$4000 | | | |
| 8192 | | 2054 | \$0806 |
| \$2000 | VARIABLES | | |
| | ARRAYS | | |
| | STRINGS | | |
| | LH | 2048 | \$0800 |

Figure 5: Integer BASIC map after running program.

MEMORY MAP machine language program from cassette. Enter BASIC and use CALL 13000 to run it. More detailed loading instructions will be provided in Part 2, along with the actual program itself.

```
3200.38DFR
Control B
CALL 13000
```

Figure 2 shows that LOMEM is set at 2048, HIMEM is set at 49152, and 47,104 bytes of free space are waiting to be used.

Now define a simple variable and call MEMORY MAP again.

```
A = 1
CALL 13000
```

Figure 3 shows that the variable is stored just above LOMEM and contains 6 bytes, as do all simple variables in Integer BASIC.

Clear the variable and enter the same statement in the form of a program.

```
Reset, Control B
10 A = 1
20 END
CALL 13000
```

Notice that the program has been stored just below HIMEM, as shown in figure 4.

Load the program again, and this time run it to see what happens.

```
Reset, Control B
10 A = 1
20 END
RUN
CALL 13000
```

The program creates the same variable in figure 5 that was entered in figure 3.

Now load the DOS. Type INT to remove the greeting program, then re-enter the above program and run it. The DOS boot will clobber MEMORY MAP, so it too will have to be reloaded. Now that we have DOS, we can use BRUN MEMORY MAP instead of the separate commands for loading and calling 13000.

```
Reset, Control B
PR#6
INT
10 A = 1
20 END
RUN
BRUN MEMORY MAP
```

Figure 6 shows the large amount of space used by the DOS and its file buffers. The default number of buffers, three, has been reserved and HIMEM has been reset to 38400.

For a more complex case, let's reserve the maximum number of file buffers, 16, drastically change the values of LOMEM and HIMEM, and run our same program again. Be aware that LOMEM: and HIMEM: are not legal Integer BASIC commands, but can be used with DOS.

```
INT
MAXFILES 16
LOMEM: 14000
HIMEM: 15000
10 A = 1
20 END
RUN
BRUN MEMORY MAP
```

The memory map in figure 7 shows that everything has been set as specified. Note the small amount of free space remaining.

MEMORY MAP: INTEGER BASIC

| | | | |
|--------|-------------------|----------|--------|
| | | 49152 | \$0000 |
| | DOS, FILES (3) | HM 38400 | \$9600 |
| | PROGRAM | | |
| Hires | | 38386 | \$95F2 |
| 24576 | | | |
| \$6000 | FREE SPACE | 36332 | \$80EC |
| 16384 | | | |
| \$4000 | | | |
| 8192 | | 2054 | \$0806 |
| \$2000 | VARIABLES | | |
| | ARRAYS | | |
| | STRINGS | | |
| | | LM 2048 | \$0800 |

Figure 6: Integer BASIC map showing DOS and program.

Applesoft Memory Maps

Applesoft stores everything quite differently than does Integer BASIC. To demonstrate, type FP to change languages and clear the preceding program, then call MEMORY MAP.

```
FP
CALL 13000
```

Figure 8 shows that the program storage area is now at the bottom of memory instead of at the top. With no program loaded, the program pointer starts at 2049 and the end of program pointer starts one or two bytes higher. LOMEM is set above the program. Location 2048 contains a "0" because each program line must be preceded by a zero.

In Applesoft, the variables, arrays, and strings are all stored in separate areas instead of in the one combined area used by Integer BASIC. We can see this by creating some simple examples and looking at the result with MEMORY MAP.

```
A = 1
DIM B(10)
C$ = "STRING"
CALL 13000
```

MEMORY MAP: INTEGER BASIC

| | | | |
|--------|--------------------|----------|--------|
| | | 49152 | \$0000 |
| | DOS, FILES (16) | 30665 | \$77C9 |
| | PROGRAM | HM 15000 | \$3A98 |
| Hires | | 14986 | \$3A8A |
| 24576 | | | |
| \$6000 | FREE SPACE | 988 | \$0304 |
| 16384 | | | |
| \$4000 | | | |
| 8192 | | 14006 | \$36B6 |
| \$2000 | VARIABLES | | |
| | ARRAYS | | |
| | STRINGS | | |
| | | LM 14000 | \$36B0 |
| | | 2048 | \$0800 |

Figure 7: Integer BASIC map with changed LOMEM and HIMEM.

| MEMORY MAP: APPLESOFT | | | |
|-----------------------|-------------------|----------|---------|
| | DOS, FILES (3) | 49152 | \$C0000 |
| | | HM 38400 | \$96000 |
| HIRES | | | |
| 24576 \$6000 | FREE SPACE | 36349 | \$80FD |
| 16384 \$4000 | | | |
| 8192 \$2000 | | | |
| | PROGRAM | LM 2051 | \$0803 |
| | | 2049 | \$0801 |
| | | 2048 | \$0800 |

Figure 8: Applesoft map with only the DOS in memory.

Notice in figure 9 that the variables start at LOMEM. Applesoft variables are seven bytes long. The variable area contains 14 bytes, for A and C\$. Arrays in Applesoft can be multidimensional, so they are placed in a separate location above the variables. The array space is determined by rules given in the Applesoft reference manual, pages 119 and 137. The string variable C\$ is stored in the variable area with a pointer to the word "STRING" in the string area. Note that the string area contains exactly six characters.

Something interesting happens when you put the above statements into the form of an executable program. Clear the memory, type in the program, and look at its memory map to see that the program has indeed been stored. See figure 10.

```
FP
10 A = 1
20 DIM B(10)
30 C$ = "STRING"
CALL 13000
```

Now run the program and look at it again.

```
RUN
CALL 13000
```

Figure 11 shows that the variable area still contains 14 bytes, and that array B is still the same, but there is no string in the string area. This is because the letters of the string are contained in the program area, and the pointer in C\$ obtains the string from the program.

Whenever new characters are assigned to the same string variable, they are added to the string area even if they are the same as those already assigned to that variable. A clutter of old strings thus begins to form, known as the "garbage collection." Its formation can be demonstrated by entering the same statement several times.

```
FP
A$ = "STRING"
A$ = "STRING"
A$ = "STRING"
CALL 13000
```

Notice in figure 12 that there are now 18 bytes stored in the string area, even though only six of them are being used.

| MEMORY MAP: APPLESOFT | | | |
|-----------------------|-------------------|----------|---------|
| | DOS, FILES (3) | 49152 | \$C0000 |
| | | HM 38400 | \$96000 |
| HIRES | STRINGS | 38394 | \$95FA |
| 24576 \$6000 | FREE SPACE | 36267 | \$80AB |
| 16384 \$4000 | | | |
| 8192 \$2000 | ARRAYS | 2127 | \$084F |
| | VARIABLES | 2065 | \$0811 |
| | PROGRAM | LM 2051 | \$0803 |
| | | 2049 | \$0801 |
| | | 2048 | \$0800 |

Figure 9: Applesoft map showing variable, array, and string areas.

The variable area contains seven bytes for A\$, the one variable in use.

The Applesoft reference manual makes the following statement on page 53:

"Applesoft stores duplicate strings only once. That is, if A\$ = "PIPPIN" and B\$ = "PIPPIN" then the string "PIPPIN" will be stored only once."

Let's try it and see.

```
FP  
A$ = "PIPPIN"  
B$ = "PIPPIN"  
CALL 13000
```

Figure 13 shows that there are 12 bytes in the string area instead of only six. If you enter the monitor mode and examine the variable area you will see that the two string variables point to different locations in the string area. This obviously indicates that Applesoft does *not* store duplicate strings only once.

The actual length of a program doesn't always correspond with the amount of memory required. Just because your program is short doesn't mean you have lots of memory left over. In Applesoft it is easy to create a multidimensional array which uses up all memory space in a 48K machine.

```
FP  
DIM A(97,73)  
BRUN MEMORY MAP
```

Figure 14 shows that there are only 80 free bytes remaining after dimensioning the array. To verify that MEMORY MAP is indeed providing accurate information, you can check the free space remaining by using the FRE(0) command.

```
PRINT FRE(0)  
80
```

If you don't need to use floating point numbers, a good way to save array space is to define the array as an integer array.

```
FP  
DIM A%(97,73)  
BRUN MEMORY MAP
```

MEMORY MAP: APPLESOFT

| | | | |
|--------|-------------------|----------|---------|
| | | 49152 | \$C0000 |
| | DOS, FILES (3) | HM 38400 | \$96000 |
| HIRES | | | |
| 24576 | | | |
| \$6000 | FREE SPACE | 36314 | \$80000 |
| 16384 | | | |
| \$4000 | | | |
| 8192 | | | |
| \$2000 | | | |
| | | LM 2086 | \$0826 |
| | PROGRAM | 2049 | \$0801 |
| | | 2048 | \$0800 |

Figure 10: Applesoft map showing program area.

MEMORY MAP: APPLESOFT

| | | | |
|--------|-------------------|----------|---------|
| | | 49152 | \$C0000 |
| | DOS, FILES (3) | HM 38400 | \$96000 |
| HIRES | | | |
| 24576 | | | |
| \$6000 | FREE SPACE | 36238 | \$8D8E |
| 16384 | | | |
| \$4000 | | | |
| 8192 | ARRAYS | 2162 | \$0872 |
| \$2000 | | 2100 | \$0834 |
| | VARIABLES | | |
| | | LM 2086 | \$0826 |
| | PROGRAM | 2049 | \$0801 |
| | | 2048 | \$0800 |

Figure 11: Applesoft map after running program.

MEMORY MAP: APPLESOFT

| | | | |
|-----------------|-------------------|----------|---------|
| | DOS, FILES (3) | 49152 | \$C0000 |
| HIRES | STRINGS | HM 38400 | \$96000 |
| 24576 \$6000 | FREE SPACE | 38382 | \$95EE |
| 16384 \$4000 | | 36324 | \$8DE4 |
| 8192 \$2000 | VARIABLES | 2058 | \$0800A |
| | PROGRAM | LM 2051 | \$0803 |
| | | 2049 | \$0801 |
| | | 2048 | \$0800 |

Figure 12: Applesoft map showing formation of "garbage collection" for one string variable.

MEMORY MAP: APPLESOFT

| | | | |
|-----------------|-------------------|----------|---------|
| | DOS, FILES (3) | 49152 | \$C0000 |
| HIRES | STRINGS | HM 38400 | \$96000 |
| 24576 \$6000 | FREE SPACE | 38388 | \$95F4 |
| 16384 \$4000 | | 36323 | \$8DE3 |
| 8192 \$2000 | VARIABLES | 2065 | \$0811 |
| | PROGRAM | LM 2051 | \$0803 |
| | | 2049 | \$0801 |
| | | 2048 | \$0800 |

Figure 13: Applesoft map of two string variables with duplicate strings.

(continued)

Note the large difference in space required for the array in figure 15 as compared to the preceding one. The addition of a % sign saved 21,756 bytes!

If you don't have ROM Applesoft installed, you must load Applesoft into RAM from either cassette or disk. To demonstrate, turn off the computer and remove the Applesoft card. Turn the computer back on and load Applesoft from disk by typing FP. Then run MEMORY MAP to see where RAM Applesoft is stored.

Control B
PR#6
FP
BRUN MEMORY MAP

Figure 16 shows that RAM Applesoft is stored below the program area, and that it uses a large amount of space. By referring to the Hi-Res locations on the left, you can see that Hi-Res graphics' page one is not available when using RAM Applesoft.

For our final example, let's create the most complicated map possible by using RAM Applesoft, a different LOMEM and HIMEM, and all types of variables. I also tried to change MAXFILES, but it doesn't seem to work with RAM Applesoft. See figure 17.

LOMEM: 15000
HIMEM: 20000
A = 1
DIM B(10)
C\$ = "STRING"
CALL 13000

That concludes the examples. Next month's article will contain the Memory Map program listing and will describe how it works.

Lieutenant Colonel Pete Cook is a jet pilot instructor at Williams Air Force Base. He is assigned to the Air Force's Human Resources Laboratory, Operations Training Division, a large research facility for designing advanced aircraft simulations, and one of the largest computer complexes in Arizona.

This is his third article for MICRO.

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 (609) 589-5500

MEMORY MAP: APPLESOFT

| | | | |
|-----------|------------|----------|--------|
| | | 49152 | \$0000 |
| DOS, | | | |
| FILES (3) | | | |
| | | HM 38400 | \$9600 |
| HIRES | | | |
| 24576 | | | |
| \$6000 | FREE SPACE | 80 | \$0050 |
| 16384 | | | |
| \$4000 | | | |
| 8192 | | | |
| \$2000 | | 38320 | \$9580 |
| ARRAYS | | | |
| | | LM 2051 | \$0803 |
| PROGRAM | | | |
| | | 2049 | \$0801 |
| | | 2048 | \$0800 |

Figure 14: Applesoft map of large floating point array.

MEMORY MAP: APPLESOFT

| | | | |
|-----------|------------|----------|--------|
| | | 49152 | \$0000 |
| DOS, | | | |
| FILES (3) | | | |
| | | HM 38400 | \$9600 |
| HIRES | | | |
| 24576 | | | |
| \$6000 | FREE SPACE | 21836 | \$554C |
| 16384 | | | |
| \$4000 | | | |
| 8192 | | | |
| \$2000 | | 16564 | \$40B4 |
| ARRAYS | | | |
| | | LM 2051 | \$0803 |
| PROGRAM | | | |
| | | 2049 | \$0801 |
| | | 2048 | \$0800 |

Figure 15: Applesoft map of large integer array.

MEMORY MAP: APPLESOFT

| | | | |
|-------------------|------------|----------|--------|
| | | 49152 | \$0000 |
| DOS, FILES (3) | | HM 38400 | \$9600 |
| HIRES | | | |
| 24576 \$6000 | FREE SPACE | 26109 | \$65FD |
| 16384 \$4000 | | | |
| 8192 \$2000 | PROGRAM | LM 12291 | \$3003 |
| | APPLESOFT | 12289 | \$3001 |
| | | 2048 | \$0800 |

Figure 16: Applesoft map with RAM Applesoft loaded.

MEMORY MAP: APPLESOFT

| | | | |
|-------------------|------------|----------|--------|
| | | 49152 | \$0000 |
| DOS, FILES (3) | | 38400 | \$9600 |
| HIRES | STRINGS | HM 20000 | \$4E20 |
| 24576 \$6000 | FREE SPACE | 19994 | \$4E1A |
| 16384 \$4000 | ARRAYS | 4918 | \$1336 |
| 8192 \$2000 | VARIABLES | 15076 | \$3AE4 |
| | PROGRAM | 15014 | \$3AA6 |
| | APPLESOFT | LM 15000 | \$3A98 |
| | | 12291 | \$3003 |
| | | 12289 | \$3001 |
| | | 2048 | \$0800 |

Figure 17: Applesoft map showing most complex case.

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3. Long timing intervals (more than 4 days) with one second resolution
4. Positive status indications
5. Settable pre-time out warning
6. Ease of operation

Before entering into an explanation of timer operation, I would like to thank John Gieryc for his helpful article in the April, 1979 issue of *MICRO*, "SYM-1 6522-Based Timer." It was John's article that provided the heart of this timer.

Operation is straightforward. After entering the program, enter desired pre-time out warning (hours, minutes, seconds) and desired operating mode. These are entered sequentially in the order indicated above, starting at address "0000". For example, you have decided, as an exercise in self improvement, to restrict yourself to 10½ hours of TV per week. However, you're not crazy about the timekeeping involved

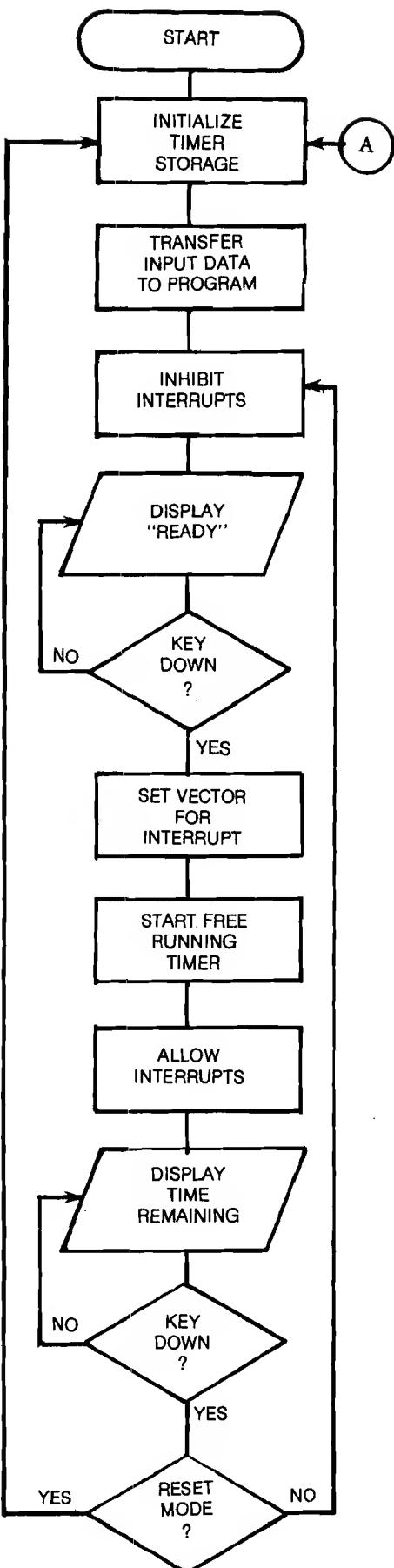
```

0800      1 ;*****TIME-REMAINING-TIMER*****
0800      2 ;*
0800      3 ;* TIME REMAINING TIMER *
0800      4 ;*
0800      5 ;* RALPH R. ORTON *
0800      6 ;*
0800      7 ;*****TIME-REMAINING-TIMER*****
0800      8 ;
0800      9 ;FOR THE SYM-1
0800     10 ;SHOWS TIME REMAINING ON READOUT
0800     11 ;AND SOUNDS A SETTABLE WARNING.
0800     12 ;DISPLAYS READY WHENEVER TIMER
0800     13 ;IS STOPPED.
0800     14 ;
0800     15 ;TWO MODES OF OPERATION:
0800     16 ;"RESET" & "ACCUMULTE"
0800     17 ;
0800     18 ;LOAD TIMER INTERVAL AND WARNING
0800     19 ;TIME STARTING AT ADDRESS $0000 AS
0800     20 ;SHOWN. LOAD MODE AT $0006. PRO-
0800     21 ;GRAM STARTS AT $0200.....
0800     22 ;
0800     23 HRSSET EPZ $00          ;SET HOURS HERE
0800     24 MINSET EPZ $01          ;SET MINUTES HERE
0800     25 SECSET EPZ $02          ;SET SECONDS HERE
0800     26 HRSWAR EPZ $03          ;WARNING HOURS HERE
0800     27 MINWAR EPZ $04          ;WARNING MINUTES HERE
0800     28 SECWAR EPZ $05          ;WARNING SECONDS HERE
0800     29 MODE EPZ $06            ;"AC" = ACCUMULATE
0800     30 HRSREM EPZ $07          ;CURRENT HOURS HERE
0800     31 MINREM EPZ $08          ;CURRENT MINUTES HERE
0800     32 SECREM EPZ $09          ;CURRENT SECONDS HERE
0800     33 FRACNT EPZ $0A          ;20THS OF A SECOND ARE HERE
0800     34 DISPIN EPZ $0B          ;INPUT FOR "LODISP" SUBROUTINE
0800     35 DISPOP EPZ $0C          ;STORAGE FOR "LODISP" SUBROUTINE

0800     36 ;
0800     37 ; MONITOR SUBROUTINES:
0800     38 ;
0800     39 NIBASC EQU $8309
0800     40 INSTAT EQU $8386
0800     41 DELAY EQU $835A
0800     42 SCAND EQU $8906
0800     43 BEEP EQU $8972
0800     44 OUTDSP EQU $89C1
0800     45 ACCESS EQU $8886
0800     46 ;
0800     47 DISBUF EQU $A640
0800     48 TV    EQU $A656
0800     49 ;
0010 50 50 DATA  ORG $0010
0010 51 51 ;
0011 79 52 BYT $50          ;R THESE ARE SEGMENT
0012 77 53 BYT $79          ;E CODES FOR "READY"
0013 5E 54 BYT $77          ;A
0014 6E 55 BYT $5E          ;D
0015 00 56 BYT $6E          ;Y
0016 57 BYT $00          ;SPACE

0200 58 ;
0200 20868B 59 TIME1 ORG $0200
0200 20868B 60 START JSR ACCESS
0203 F8 61 SED
0204 A900 62 RESET LDA #$00          ;INITIALIZE FRACTION
0206 850A 63 STA FRACNT          ;COUNTER
0208 A500 64 LDA HRSSET
020A 8507 65 STA HRSREM          ;TRANSFER TIME SET
020C A501 66 LDA MINSET          ;VALUES TO TIME
020E 8508 67 STA MINREM          ;COUNT LOCATIONS
0210 A502 68 LDA SECSET
0212 8509 69 STA SECREM
0214 A904 70 LDA #$04          ;INITIALIZE MODE OF OPER-
0216 8D7902 71 STA STOMOD+1          ;ATION TO RESETABLE..
0219 78 72 CONTIN SEI          ;INHIBIT INTERRUPTS
021A A205 73 LDX #$05
021C B510 74 LODE LDA $10,X          ;LOAD DISPLAY:BUFFER
021E 9D40A6 75 STA DISBUF,X          ;WITH "READY"...
0221 CA   76 DEX
0222 10F8 77 BPL LODE

```



| | | | | |
|-------------|-----|--------|--------------|-----------------------------------|
| 0224 200689 | 78 | SHORDY | JSR SCAND | ;SHOW "READY" |
| 0227 208683 | 79 | JSR | INSTAT | ;CHECK FOR KEY DOWN |
| 022A 90F8 | 80 | BCC | SHORDY | ;IF KEY NOT DOWN, SHOW "READY"... |
| 022C A900 | 81 | LDA | \$800 | |
| 022E 8D7EA6 | 82 | STA | \$A67E | ;LOAD IRQ VECTOR |
| 0231 A903 | 83 | LDA | \$803 | ;WITH ADDRESS 0300 |
| 0233 8D7FA6 | 84 | STA | \$A67F | |
| 0236 A9C0 | 85 | LDA | \$8C0 | ;LOAD IER VECTOR |
| 0238 8D0EA0 | 86 | STA | \$A00E | |
| 023B AD0DA0 | 87 | LDA | \$A00D | ;LOAD IFR REGISTER |
| 023E 29BF | 88 | AND | \$8BF | |
| 0240 8D0DA0 | 89 | STA | \$A00D | |
| 0243 A9C0 | 90 | LDA | \$8C0 | |
| 0245 8D0BA0 | 91 | STA | \$A00B | |
| 0248 A950 | 92 | LDA | \$850 | |
| 024A 8D06A0 | 93 | STA | \$A006 | |
| 024D A9C3 | 94 | LDA | \$8C3 | |
| 024F 8D05A0 | 95 | STA | \$A005 | |
| 0252 58 | 96 | CLI | | |
| 0253 A507 | 97 | LOAD | LDA HRSREM | ;GET |
| 0255 850B | 98 | STA | DISPIN | ;AND |
| 0257 206E03 | 99 | JSR | LODISP | ;LOAD |
| 025A A508 | 100 | LDA | MINREM | ;TIME |
| 025C 850B | 101 | STA | DISPIN | ;REMAINING |
| 025E 206E03 | 102 | JSR | LODISP | ;INTO DISPLAY BUFFER |
| 0261 A509 | 103 | LDA | SECREM | ;HRS. |
| 0263 850B | 104 | STA | DISPIN | ;MIN. |
| 0265 206E03 | 105 | JSR | LODISP | ;SEC. |
| 0268 A9AC | 106 | LDA | \$8AC | ;DETERMINE MODE SELECTED |
| 026A C506 | 107 | CMP | MODE | ;AND |
| 026C F00D | 108 | BEQ | SETMOD | ;CHANGE IF REQUIRED. |
| 026E A904 | 109 | SHOW | LDA \$804 | ;DISPLAY TIME REMAINING |
| 0270 8D56A6 | 110 | STA | TV | ;UNTIL INTERRUPTED |
| 0273 205A83 | 111 | JSR | DELAY | ;OR KEY IS DOWN |
| 0276 90D8 | 112 | 8CC | LOAD | |
| 0278 4C0402 | 113 | STOMOD | JMP RESET | :04 MAY BE CHANGED TO 19 |
| 027B A919 | 114 | SETMOD | LDA \$819 | ;UNDER PROGRAM CONTRDL, |
| 027D 8D7902 | 115 | | STA STOMOD+1 | ;DEPENDS ON MODE. |
| 0280 4C6E02 | 116 | JMP | SHOW | |
| 0283 207289 | 117 | JSR | 8BEEP | ;BEEPER RDUTINE |
| 0286 207289 | 118 | JSR | BEEP | ;FOR WARNING |
| 0289 207289 | 119 | JSR | BEEP | |
| 028C 207289 | 120 | JSR | BEEP | |
| 028F 207289 | 121 | JSR | BEEP | |
| 0292 60 | 122 | RTS | | |
| 0293 207289 | 123 | TIMOUT | JSR 8BEEP | ;BEEP! |
| 0296 | 124 | ; | | |
| 0296 208683 | 125 | JSR | INSTAT | ;CHECK FOR KEY DOWN |
| 0299 90F8 | 126 | BCC | TIMOUT | ;IF NO KEY DOWN, BEEP AGAIN |
| 029B 4C0002 | 127 | JMP | START | ;IF KEY DOWN, JUMP TO START |
| 029E | 128 | ; | | |
| 029E | 129 | ; | | |
| 0300 | 130 | TIMER | ORG \$0300 | |
| 0300 08 | 131 | PHP | | ;INTERRUPT RDUTINE |
| 0301 48 | 132 | PHA | | ;STARTS HERE SO |
| 0302 8A | 133 | TXA | | ;SAVE IMPORTANT |
| 0303 48 | 134 | PHA | | ;REGISTERS |
| 0304 98 | 135 | TYA | | |
| 0305 48 | 136 | PHA | | |
| 0306 E60A | 137 | INC | FRACT | ;INCREMENT FRACTIONS |
| 0308 A50A | 138 | LDA | FRACT | ;OF A SECOND COUNTER |
| 030A C914 | 139 | CMP | \$14 | ;IF FULL SECOND IS |
| 030C F003 | 140 | BEQ | REFRAC | ;NOT UP YET JUMP TD |
| 030E 4C6403 | 141 | JMP | ENDINT | ;END INTERRUPT ROUTINE |
| 0311 A900 | 142 | REFRAC | LDA \$800 | |
| 0313 850A | 143 | STA | FRACT | |
| 0315 38 | 144 | SEC | | |
| 0316 A509 | 145 | LDA | SECREM | |
| 0318 E901 | 146 | SBC | \$801 | |
| 031A 8509 | 147 | STA | SECREM | |
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| 0320 A959 | 150 | LDA | \$859 | |
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| 0324 38 | 152 | SEC | | |
| 0325 A508 | 153 | LDA | MINREM | |
| 0327 E901 | 154 | SBC | \$801 | |
| 0329 8508 | 155 | STA | MINREM | |
| 032B C999 | 156 | CMP | \$899 | |
| 032D D00B | 157 | BNE | CHKEND | |
| 032F A959 | 158 | LDA | \$859 | |
| 0331 8508 | 159 | STA | MINREM | |
| 0333 38 | 160 | SEC | . | |
| 0334 A507 | 161 | LDA | HRSREM | |
| 0336 E901 | 162 | SBC | \$801 | |
| 0338 8507 | 163 | STA | HRSREM | |
| 033A A507 | 164 | CHKEND | LDA HRSREM | |
| 033C C900 | 165 | CMP | \$800 | |
| 033E D00F | 166 | BNE | CHECK | |
| 0340 A508 | 167 | LDA | MINREM | |
| 0342 C900 | 168 | CMP | \$800 | |
| 0344 D009 | 169 | BNE | CHECK | |
| 0346 A509 | 170 | LDA | SECREM | |
| 0348 C900 | 171 | CMP | \$800 | |
| 034A D003 | 172 | BNE | CHECK | |
| 034C 4C9302 | 173 | JMP | TIMOUT | |
| 034F A505 | 174 | CHECK | LDA SECWAR | |

Figure 1: Main Routine

```

0351 C509    175     CMP SECREM      ;TO TIME REMAINING HR/MIN/SEC
0353 D00F    176     BNE ENDINT     ;IF NOT A MATCH, GOTO
0355 A504    177     LDA MINWAR    ;END INTERRUPT ROUTINE
0357 C508    178     CMP MINREM      ;SOUND A WARNING
0359 D009    179     BNE ENDINT
035B A503    180     LDA HRSWAR
035D C507    181     CMP HRSREM
035F D003    182     BNE ENDINT
0361 208302   183     JSR WARN      ;RESET TIMER INTERRUPT FLAG
0364 AD04A0    184     ENDINT LDA $A004
0367 68      185     PLA          ;RESTORE
0368 A8      186     TAY          ;ALL
0369 68      187     PLA          ;PREVIOUSLY
036A AA      188     TAX          ;SAVED
036B 68      189     PLA          ;REGISTERS
036C 28      190     PLP          ;AND
036D 40      191     RTI          ;RETURN FROM INTERRUPT...
036E A50B    192     LODISP LDA DISPIN
0370 850C    193     STA DISPOP    ;GET DIGITS TO BE
0372 6A      194     ROR          ;DISPLAYED AND SAVE
0373 6A      195     ROR          ;FOR LATER RECALL.
0374 6A      196     ROR          ;POSITION MSD FOR CONVERSION
0375 6A      197     ROR          ;TO ASCII
0376 200983   198     JSR NIBASC    ;LOAD DIGIT
0379 20C189   199     JSR OUTDSP    ;GET OTHER DIGIT AND CONVERT
037C A50C    200     LDA DISPOP
0378 200983   201     JSR NIBASC    ;TO ASCII...
0381 20C189   202     JSR OUTDSP    ;THEN LOAD DIGIT
0384 60      203     RTS          ;RETURN FROM SUBROUTINE...

```

in such an effort. So, you guessed it, here comes the SYM Timer. Starting at address "0000" you punch in "10" "30" "00". Then to provide a one-hour warning you continue with "01" "00" "00". At this point you are ready to select mode of operation.

By entering "AC" you will select the "Accumulative" mode of operation. In this mode you can "start" and "stop" the timer as often as required. The timer will continue timing at each "start" from where it was last stopped. If you had entered anything other than "AC" you would have selected the "Resettable" mode of operation. In this mode each "start" causes the timer to begin again from the original timer interval you set.

With a simple "Go" "200" "CR" SYM displays "ready". To start the timer press any key and time remaining is displayed. To stop the timer once more press any key and "ready" is displayed again.

When the timer reaches the pre-time out warning the beeper will sound momentarily, and when time out occurs, the beeper will sound continuously until it is reset by pressing any key.

Well that's it—maybe! I keep fighting off the urge to toss in more and more. For instance, how about a 1 year timer that reads out "Hrs x 100" "Hrs." "Min."? Or if that's a little ridiculous, then maybe one that displays "days" "hrs." "min." for in excess of 3 months of timing. Then of course we could have an option to display elapsed time as well as time remaining. I don't suppose it would be too difficult to toss in a 24 hour clock while we're at it. Of course it would have to operate simultaneously with all the other options.

So on and on it goes. For now, however, I will leave it to others to perfect the *ultimate* time machine.

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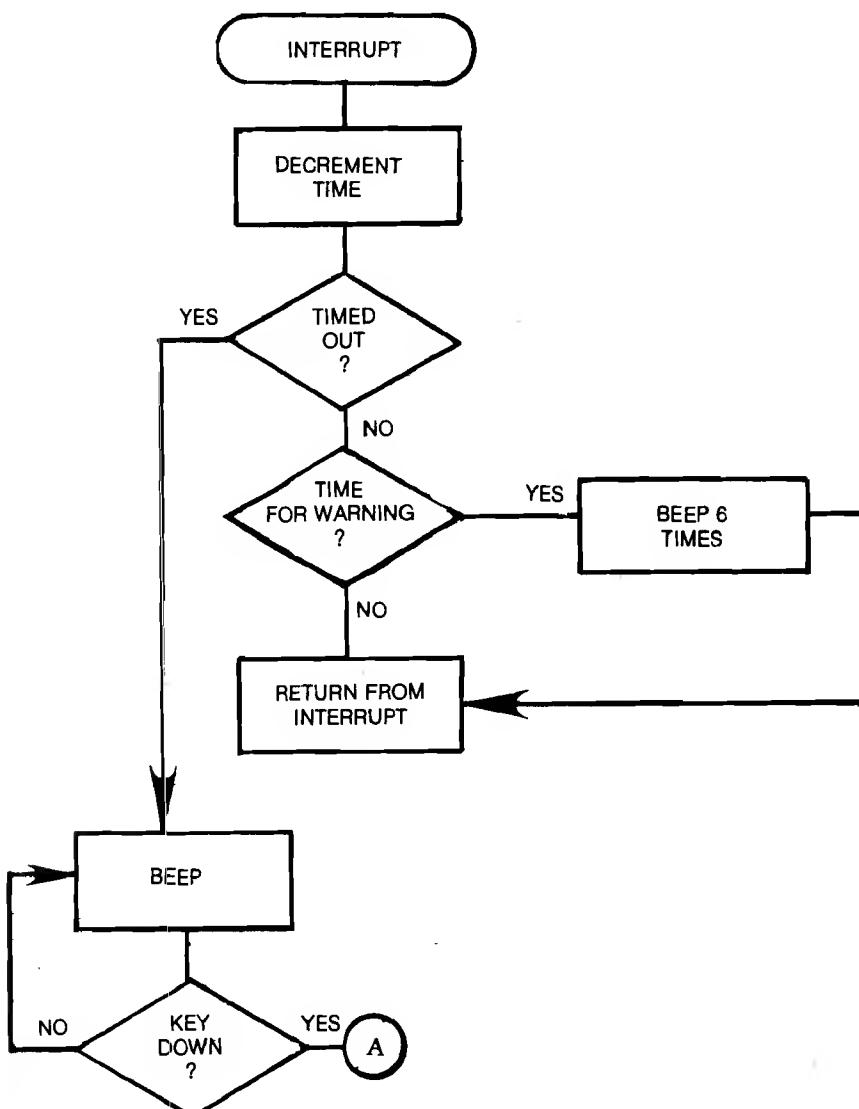


Figure 2: Interrupt Routine

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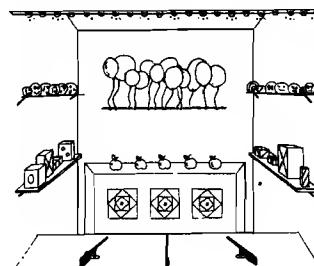
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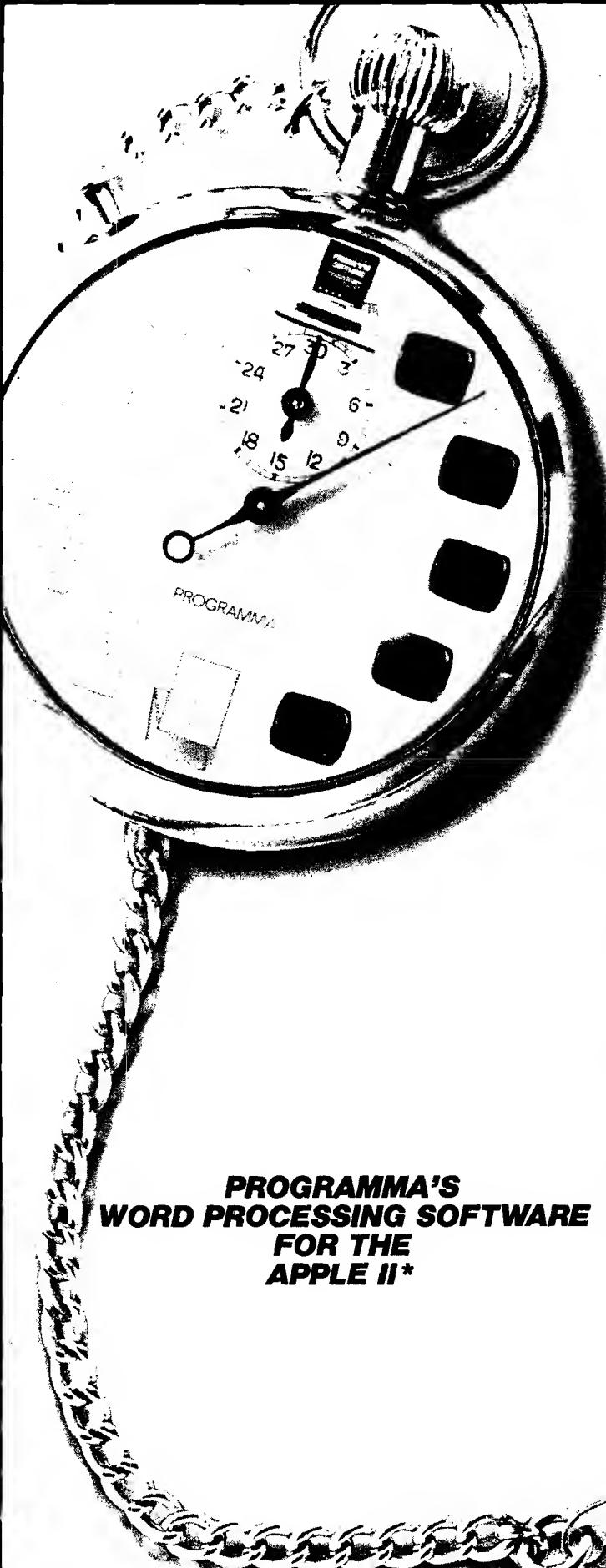


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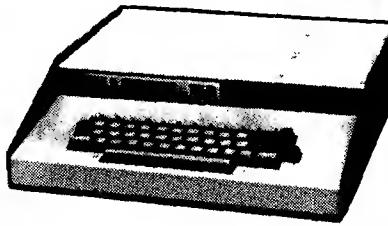
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Oh No — It's Garbage Collect!

This article describes Garbage Collect in Microsoft's 6502 BASIC. The worst case is described, and a few suggestions made on how to avoid it.

Gordon A. Campbell
36 Doubletree Road
Willowdale, Ontario
M2J 3Z4

I was really pleased! The simple text editor worked well. It even had a fancy quasi-INPUT routine, just like CURSOR. And it only took a couple of days to develop, since it was written entirely in BASIC. Now to get on with some articles.

The first opus went well. After several input sessions, I ran a full draft. All the changes were going well, when suddenly, right in the middle of entering a command, the PET went dead. Pushing the STOP key did nothing, so I sat back to consider my sins. After a minute, the cursor returned, and the editor was again working.

The light came on. I was the victim of the dreaded garbage collect.

Garbage collect is the compression of string space. In Microsoft's 6502 BASIC, string contents are placed at the top of memory, working down. When a string is assigned a new value, it is placed below all previous strings. At some point, memory is filled, so garbage collect squishes all the strings back up to the top. It may also be forced, by using FRE(0).

The following one-liner provides the basis for some experiments:

```
5 N=1000:  
B$=CHR$(1):  
DIM A$(N):
```

```
FOR J = 0 TO N:  
A$(J) = B$:  
NEXT:  
A$(0) = "B":  
T = T:  
PRINT FRE(0) TI-T
```

The program sets up bunches of strings, changes the first one, and forces garbage collect while printing the time required. (The CHR\$ is required since assigning a string a literal value results in the string pointer pointing at the literal in the program, rather than use of string space.)

Changing N showed that the number of strings has a roughly exponential effect on the time required. Changing the size of B\$ showed that the number of characters in the strings has no apparent effect on the time.

To find the worst case, some swift calculation shows that N can be set to 7908, and garbage collect takes 84 minutes and 13 seconds. But we can go higher. Drop the start-of-BASIC down to the first cassette buffer, and raise the top-of-memory to the end of the screen. Now N can be set to 8261, for a time of 91 minutes and 56 seconds!

How about other machines? A call to a friend showed that Applesoft is compatible with the PET. The only difference is the 10% that the PET spends looking at the keyboard and cassettes, and updating the clock. Down at our neighborhood Radio Shack we found that string space must be reserved with a 'CLEAR n' command. There is no apparent time spent in garbage collect, but there is a value for the CLEAR command which seems to crash the system, so that may be it. Presumably the Atari with its fixed-length strings doesn't create garbage in the first place.

Published information indicates that the latest PET ROM-set does garbage collect much more quickly. In a classic trade-off of speed versus memory, it also takes two bytes more

per string. The ways to reduce garbage collect are fairly obvious: don't have more strings than are absolutely required. For example:

1. Re-use work variables.
2. Use numbers rather than strings for switches.
3. Put literals right into PRINT statements rather than use constant strings.
4. Try to create the most stable strings first.
5. Avoid loops which create a string by concatenating a character at a time onto the string.
6. Apply the usual techniques to keeping your program small.
7. Avoid sorting techniques which involve changing the actual contents of the array. Instead, use QUICKSORT, or an Assembler sort which changes the string pointers.

Garbage collect will happen in any case. In interactive programs without a large number of strings, it can be made invisible to the operator by forcing it ($X = FRE(0)$) during times when the operator doesn't expect to use the keyboard. For 'batch' programs, the least amount of time will be consumed by just letting it happen when it must.

In summary, the next time your PET [Apple, SYM] seems to crash, don't reset it right away. It may just be collecting its garbage.

After 15 years in main-frame data processing, Gordon Campbell purchased a cassette-based PET in the spring of 1979. Since then, the PET has grown a disk, printer, and modem. The latest expansion provides CB2 sound in stereo.

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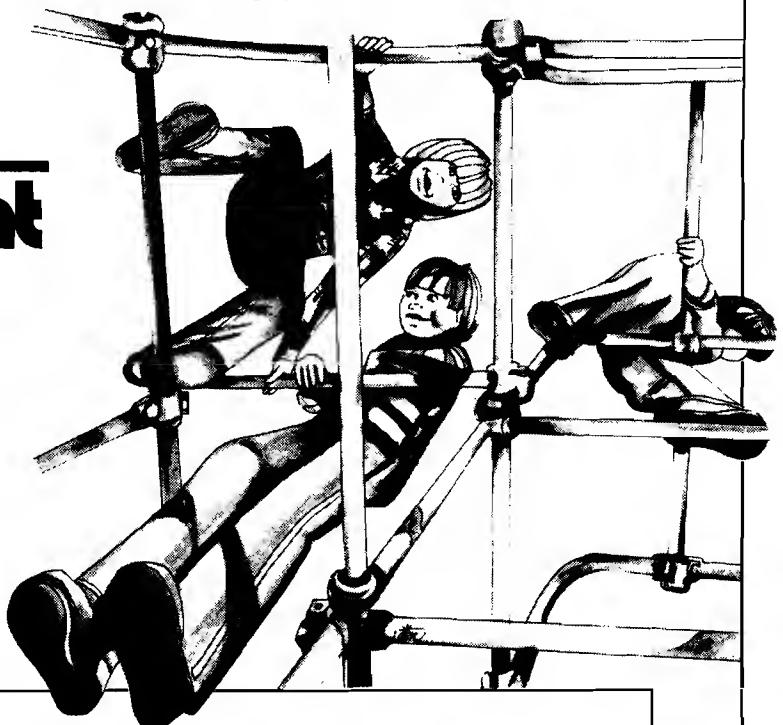
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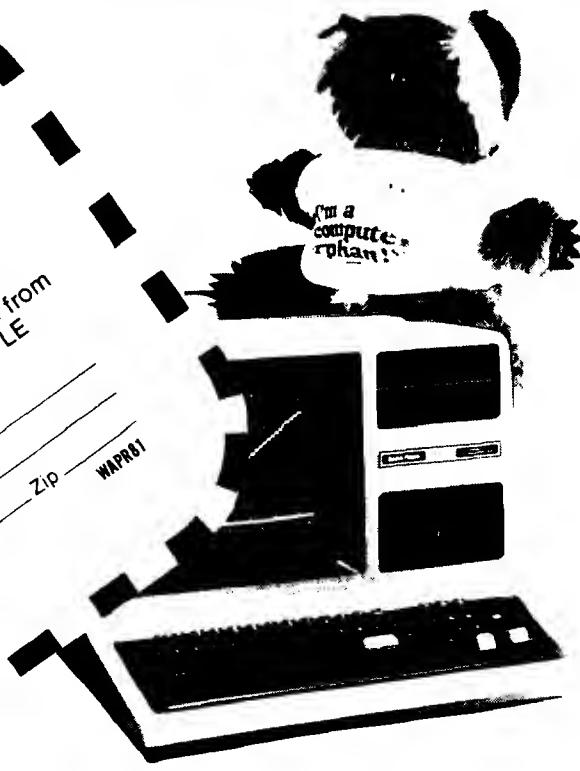
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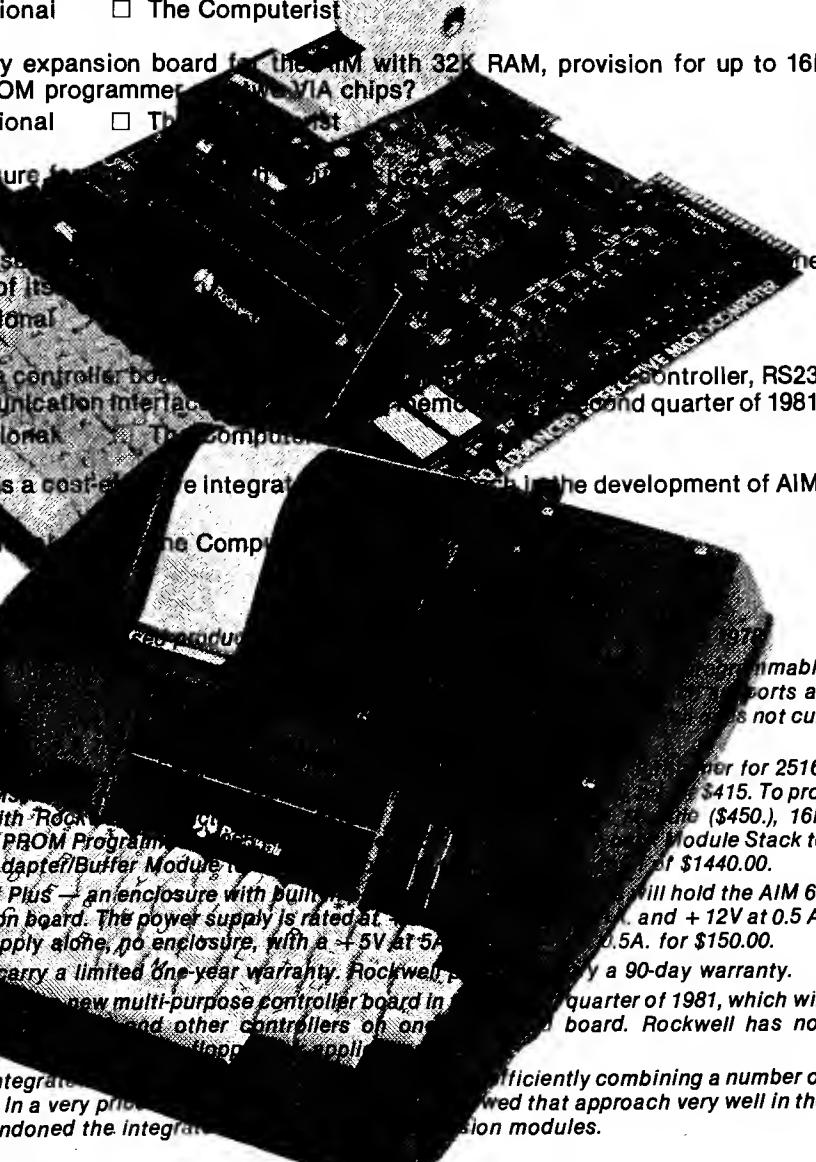


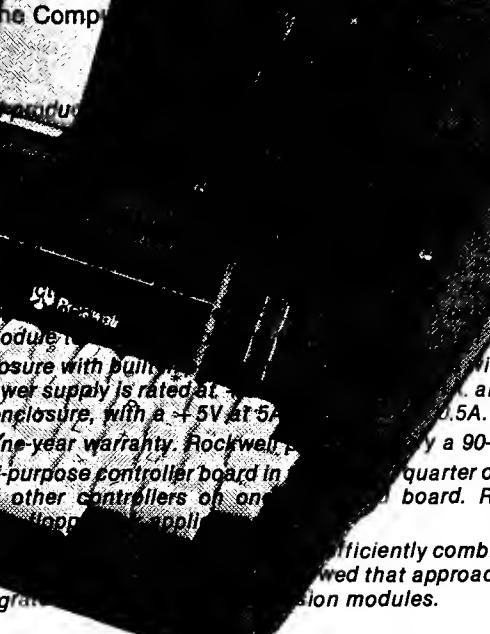
An AIM 65 Intelligence Test

Please answer each question:

- 1** Who has been offering complete 6502-based products since 1976?
 Rockwell International The Computerist

- 2** Who makes a video expansion board for the AIM 65 that fully supports the AIM Monitor, Editor, Assembler and BASIC?
 Rockwell International The Computerist

- 3** Who offers a memory expansion board for the AIM with 32K RAM, provision for up to 16K EPROM, and an EPROM programmer? 
 Rockwell International The Computerist

- 4** Who offers an enclosure for the AIM 65? 
 Rockwell International The Computerist

- 5** Which company has started offering a one-year warranty on all of its products?
 Rockwell International The Computerist

- 6** Who will be offering a controller board for the AIM 65 with a serial controller, RS232C, asynchronous communication interface, and other controllers in the second quarter of 1981?
 Rockwell International The Computerist

- 7** Who consistently uses a cost-effective integrated circuit design philosophy in the development of AIM-oriented products?
 Rockwell International The Computerist

Answers:

1. **The Computerist** started offering complete 6502-based products in 1976.
2. **The Computerist** Video Expansion Board supports all major screen formats, EPROMs, and major AIM firmware.
3. **The Computerist** offers a memory expansion board for 2516, 2716, 2532, and 32K EPROMs. These boards provide similar capabilities with Rockwell's PROM/RAM module (\$175.), PROM Programmer (\$150.), and the Adapter/Buffer Module (\$125.).
4. **The Computerist** offers AIM Plus — an enclosure with built-in power supply and a memory expansion board. The power supply is rated at +5V at 5A and +12V at 0.5 A. Rockwell's power supply alone, no enclosure, with a +5V at 5A and +12V at 0.5 A. for \$150.00.
5. **The Computerist** carries a limited one-year warranty. Rockwell carries a 90-day warranty.
6. **The Computerist** will offer a new multi-purpose controller board in the second quarter of 1981, which will include floppy disk, serial, parallel, and other controllers on one board. Rockwell has not announced such a product.
7. **The Computerist** uses the integrated circuit design philosophy of efficiently combining a number of functions on a single board in a very price conscious manner. Rockwell has followed that approach very well in the AIM 65, but has totally abandoned the integrated circuit design philosophy in their expansion modules.

- 8** Now, where are you going to look for support for your AIM 65?
 Rockwell International The Computerist

Answer: If you answered "The Computerist" to question 8, then you pass the AIM Intelligence Test. So send for our 1981 Product Guide. If you answered "Rockwell International", then maybe you didn't understand the question.

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THE COMPUTERIST®

MICRO

New Publications

Mike Rowe
New Publications
P.O. Box 6502
Chelmsford, MA 01824

This column lists new publications received for review and also reports on pertinent publication announcements received from book and periodical publishers.

General 6502

The 6502 Instruction Handbook by Scelbi Publications (20 Hurlbut Street, Elmwood, Connecticut 06110), 1981, 44 pages, $3\frac{3}{4} \times 8\frac{1}{2}$ inches, paperbound. \$4.95

Designed as a shirt-pocket guide for programmers, technicians, and engineers. Portions of the publication appeared originally in *SCELBI's 6502 Software Gourmet Guide & Cookbook* (by Robert Findley, 1979). This slim reference work, available from computer stores or for an extra 50¢ from the publisher, contains a synopsis of each instruction set for the 6502 CPU. Mnemonics and machine codes in hexadecimal format are provided for each addressing mode. Appendices list the instruction set alphabetically by assembler mnemonics as well as numerically by machine code. Other information provided includes a hexadecimal-to-decimal conversion chart, a chip pinout diagram, timing data, and diagrams of chip architecture.

6502 Games by Rodney Zaks. 6502 Series, Volume IV, Sybex Inc. (2344 Sixth Street, Berkeley, California 94710), 1980, x, 292 pages, 50 figures, $5\frac{1}{2} \times 8\frac{1}{2}$ inches, paperbound. ISBN: 0-89588-023-9 \$12.95

This book is designed as an educational text for the programmer who wants to learn advanced programming techniques by using the 6502. Although it can be used merely to play games with a 6502-based board, for educational purposes, the reader should be familiar both with the 6502 instruction set and with basic programming techniques. The programs listed are for the SYM but can be adapted to other 6502-based microcomputers.

CONTENTS: *Introduction*—The Games Board. *Music Player*—Play a sequence of up to 255 notes (13 different notes) and record it automatically. *Translate*—The computer displays a binary number. Each player in turn must press the hexadecimal equivalent as quickly as possible. The first to score 10 wins. Designed for two players. *Hexguess*—Guess a 2-digit hex number generated by the computer. The computer will tell you how far off your guess is. You are allowed up to 10 guesses. *Magic Square*—Light up a perfect square on the board. Each key inverts some LED pattern. Skill and logic are required. *Spinner*—A light is spinning around a square. You must catch it by hitting the corresponding key. Every time you succeed, it will spin faster. A game of skill. *Slot Machine*—A Las Vegas type slot machine is simulated, with three spinning wheels. Try your luck. *Echo*—Recognize and duplicate a sound/light sequence (also known as SIMON—A manufacturer trademark). *Mindbender*—Play against the dealer (the computer) with a deck of 10 cards. You may hit or stay. Don't bust! *Blackjack*—Guess a sequence of numbers generated by the computer. It will tell you how many digits are correct and in the right position (also known as MASTERMIND—a manufacturer trademark). *Tic-Tac-Toe*—Try to achieve three in a row before the computer does in this favorite game of strategy. The computer's ability improves with yours. Can you outsmart it? *Appendices:* A. 6502 Instructions—Alphabetic; B. 6502—Instruction Set: Hex and Timing. *Index*.

AIM 65

AIM 65 Laboratory Manual and Study Guide by Leo J. Scanlon. John Wiley & Sons (605 Third Avenue, New York, New York 10158) 1981, 180 pages, diagrams and charts, $8\frac{1}{2} \times 11$ inches, paperbound.

ISBN: 0-471-06488-2 \$7.95

A study and exercise book designed to introduce students to microcomputers by working with the AIM 65. Pages are perforated so that the student's answers, written in the book, can be handed in, lesson by lesson, for review by the instructor. The author, employed by Rockwell International, the manufacturer of the AIM 65, provides 32 pages of answers to the experiments.

CONTENTS: Getting to Know the AIM 65; Addition Operations; Subtraction and Logical Operations; Program Sequencing; Debugging Programs; Multiplication Operations, with Shift & Rotate; Division Operations; Subroutines and the Stack; Unordered Lists; Sorting Unordered Data; Code Conversion from Input; Code Conversion for Output; Input/Output; A More Powerful I/O Device, the R6522 VIA; Interrupts; A Timing Program with Decimal Output; The AIM 65 Assembler; Answers to Experiments.

General Microcomputer

The Personal Computer Book by Robin Bradbeer. Input Two-Nine, an imprint of MCB Publications Limited (198/200 Keighley Road, Bradford, West Yorkshire, England BD9 4JQ), 1980, 220 pages, illustrated, $8\frac{1}{4} \times 5\frac{1}{2}$ inches, paperbound.

ISBN: 0-905897-56-0 U.S. \$15.00; £5.25

An introductory work on microcomputers, written especially for readers in the United Kingdom.

CONTENTS: *What's It All About?*—The computer can assist us tremendously, both in business and pleasure; How is it possible?; The first hobby computer; Who buys personal computers?; What do you use the computer for?; Developments in the next few years. *Where Do I Start?*—Ten hints to help you on your way. *The Computer—What Is It? How Does It Work?*—The computer—confusingly versatile; How the computer works, in simple terms; Binary numbers; How does the computer handle binary numbers?; The processor—the CPU—from the inside; The computer's own road network—the bus; Storage inside the computer. *How Do I Talk to the Computer?*—Machine Language; Assembly language; High-level languages; At which level do I begin?; BASIC—a convenient language; Firmware; Software; Which microprocessor is best? *What's In the Boxes?*; Input devices; Keyboard-based input; Speech recognition; Direct Input; Storage media; Cassette storage; Disk storage; Other storage media; Output devices; Video output; Printed output; Electric typewriter/TTY; Matrix printers; Daisy wheel printer; Other printers; Speech synthesis. *What Can I Buy?*—The Computer system; Personal computer equipment survey; Part 1, Section A—Single board computers; Kit-built systems; Training systems, Part 1, Section B—Desk top systems. Part 1, Section C—Bus-based systems—S100 Bus. Part 1, Section D—Other Buses—SS 50, Non-standard. Input/Output devices, memory storage media; other media; Part 2—Printers. Part 3—Video display units. Part 4—Other peripherals. How do I choose a system? *What Can I Do With It?*—Games; Education; Business use; Word processing; Information handling; Controlling things; Making money; Examples of personal computers in use. *Appendices:* A. Binary Arithmetic; Octal; Hexadecimal; ASCII Code. B. Bus Standards; S100 (IEEE); SS50, etc. C. Manufacturers and Distributors in U.K. D. Computer Clubs in the U.K. E. Magazines in English... UK/USA/Continent. F. Bibliography of Selected Microcomputer Books. G. Glossary. H. Some Hints on Kit-build Systems.

(Continued on following page)

The Carl Helmers Personal Computer Letter is a monthly newsletter which began publication with the January 1981 issue. Helmers, a co-founder of *Byte* magazine and its former Editorial Director, provides subscribers with analyses of issues and trends affecting the small computer industry. Helmers plans to offer subscribers the opportunity to participate in a monthly Personal Computer Industry Conference Call which he will moderate. Each issue is a minimum of 8 pages; some may run to 24 or 48 pages. A one-year subscription is \$200.00 from North American Technology, Inc., 174 Concord Street, Suite 23, Peterborough, New Hampshire 03458.

Microcomputers and Business

Basic Business Software by E.G. Brooner. Blacksburg Continuing Education Series, Howard W. Sams & Co., Inc. (4300 West 62nd Street, Indianapolis, Indiana 46268), 1980, 142 pages, charts, diagrams, and listings, 5½ x 8½ inches, paperbound.

ISBN: 0-672-21751-1 \$9.95

This book is designed primarily for business people who want to understand some of the fundamentals of business software development. But it is also for programmers who want to learn more about business software. Some familiarity with BASIC-language programming is assumed. The author aims to teach readers either to write some of their own business software or evaluate programs written by others. Sample programs are included.

CONTENTS: *Introduction to Small-Business Software*—Objectives; Small-Business Computers Defined; Effect on Paper Work; Businesses that Benefit; Software Costs; Self-Help Test Questions. *Software Fundamentals*—Objectives; Software Functions; Computer Languages; The Operating System; Software Defined; Language-Independent Programming; BASIC Comparison and Translation; Self-Help Test Questions; References. *How To Choose Appropriate Business Software*—Objectives; Practical Limits; Where To Get It; When Customizing Is Needed; Compatibility; Self-Help Questions. *How Programs Are Put Together*—Objectives; Terms Defined; The Use of Symbols in Programming; The Step-by-Step Method; Subroutines, or Modules; Programming Hints; Summary of the Step-by-Step Method; Debugging Hints and Other Techniques; The Disk Subsystem; Self-Help Test Questions. *Information Storage and Retrieval*—Objectives; Data Generation and Storage; How Data Is Stored; Disk Handling; The Disk Library; File Structure; Overview of "CHECKING"

Program; Sorting Computer Data; Program Analysis; "NAMELIST"; Self-Help Test Questions; References. *Inventory Control*—Objectives; Who Needs an Inventory?; Inventory as a List; Inventory Functions; Program Analysis; Program Evaluation; Rapid Search Methods; Summary; Self-Help Test Questions; Reference. *Payroll Programs*—Objectives; Payroll Requirements; Printing on Prepared Forms; Program Development; The Master File; Master Payroll Program; Entering Employee Data; Payroll Entries and Calculations; Entering Pay Data; Pay Procedure; Payroll Summary; Conclusion; Self-Help Test Questions; Test Programming Project. *General Ledger Programs*—Objectives; Terms Defined; General Ledger Defined; System Overview; Transaction Examples; Program Descriptions; Operating the General Ledger System; Self-Help Test Questions; Test Project. *An Introduction to Word Processing*—Objectives; Word-Processing Functions; Office of the Future; Hardware Requirements; Suitable Software; Time Sharing. *Basic Computer Modeling and Simulation*—Objectives; The Break-Even Example; Graphical Method; The Computer Technique; Other Simulation Problems; Random Numbers; Self-Help Test Questions; References. *Appendix*—ASCII Code Chart; Glossary; Index.

Small Computers for the Small Businessman by Nicholas Rosa and Sharon Rosa, dilithium Press (30 N.W. 23rd Place, Portland, Oregon 97210), 1980, x, 332 pages, 5½ x 8-5/16 inches, paperbound.

ISBN: 0-918398-31-2 \$12.95

This book is written for *small business* people and is mostly about small computers, specifically microcomputers. It is intended to help the reader select the computer that best meets his business needs.

CONTENTS: *The Small Computer Revolution*—But we're not trying to sell you; "The price of a new car"; Then why shouldn't you wait?; Now, about that rash idea...; Affording it; Turnkey in the store; Graphics; How "big" a system; Making money directly; "But I'm not a computer freak..."; That mini- and micro-distinction; What about just renting services?; Now whaddaya mean, "Revolution?" The integrated circuit; But what's a semiconductor? Large scale integration; And suddenly—; Voila! The significance. *The Small Business Computer*—Interfacing; Memories are made of this...; A final memory; Mass storage; The other stuff. *This Thing Called Software*—Documentation; Programs; Computer languages; Those translating programs; What BASIC looks like; Enough, already; Now, about that problem...; Acquiring the stuff. *Data Processing and Word Processing*—The nature of data processing; The nature of word processing; Choosing a system. *How to Shape Your*

Computer System—Getting into it; Using the consultant; Finding the consultant; Finding the vendor; Getting it all in writing; Involving your staff; The happy outcome. *Buying Services Instead*—Service bureaus; Timesharing; Whither timesharing? Amen, amen. *The Minicomputer*—But anyway; Acquisition notes; Again, what's a mini?; Making a decision; The cloudy crystal ball; The onrushing dawn. *Shopping for Your Hardware*—How much to buy?; The double system; System in one cabinet? Memory options; Where to buy; Guarantees; Notes on I/O devices; Keyboards; Writehand™; Teleprinters; Teletype™; Electric typewriters; CRT display; Other displays; Cassette drive; Floppy disks, diskettes; Hard disks; Winchesters; Printers; Isolators; noise suppressors; Power supplies; Front panel; Modems; The computer room; "Desk tops" and accessories; Cost and quality; Watch out. *The Professions and the Computer*—The accountant; The law office; The doctor's office; The writer's office; That bottom line (financing); Leasing; Tax benefits. *The Butcher, The Baker and The Candelstick Jobber*—The small manufacturer; Construction and lumber; Warehouses; Real estate; Insurance; A portrait studio; Pharmacy; Restaurant; Finding out more. *Glossary*. *Appendix*—How It All Works. *Index*.

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Software News — The Computer Software Products Newspaper is a newspaper tabloid which will appear monthly beginning in May. Sentry Database Publishing, a division of Technical Publishing, will issue the tabloid [Technical Publishing is the publisher of *Datamation* and is owned by The Dun & Bradstreet Corporation]. *Software News* will report on the software industry. It will provide analysis and commentary on applications packages, systems software, productivity aids, databases, and language processors. It will cover data and software security, software legal issues, and job opportunities; and it will offer user ratings and surveys, software vendor profiles, market statistics, and other business and financial information. The newspaper will be distributed to 50,000 software buyers and specifiers. For information, write Software News, 5 Kane Industrial Drive, Hudson, Massachusetts 01749.

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Software: Educational, Personal, Business, Games
Publications: MICRO, Compute, Kilobaud, 80-Microcomputing

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Computers Plus
177 Church St.
Burlington, Vermont 05401
Contact: Tim Barden
802/658-5858
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Publications: MICRO, Byte, Creative Computing, Microcomputing

Connecticut

The Computer Store
63 South Main St.
Windsor Locks, Connecticut 06096
Contact: Susan Bramley
203/627-0188
Hardware: Apple, HP-85
Software: Educational, Personal, Business, Games
Publications: MICRO, Byte, Nibble, Creative Computing

Southbury Professional Systems Inc.
D.B.A. The Micro-Computer Store
Union Square
Southbury, Connecticut 06488
Contact: Marilyn or Joseph Osterman
203/264-2983

Hardware: Apple, Atari, Vector Graphic
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New Jersey

Software City
111 Grand Ave.
River Edge, New Jersey 07661

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Time Enterprise
8247 Genesee Road
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716/592-7665
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Software: For OSI

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Software: Educational, Personal, Business, Games

Maryland

Computer Crossroads, Inc.
9143 G Red Branch Road
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301/730-5513
Hardware: Apple, Atari
Software: Educational, Personal, Business, Games
Publications: Many

Virginia

Computerland of Tysons Corner
8411 Old Courthouse Road
Vienna, Virginia 22180
Contact: Rich Doud
703/893-0424

Hardware: Apple, Atari, CBM, PET, North Star, Dynabyte, T.I., Cromemco
Software: Educational, Personal, Business, Games, Languages, Utilities, etc.
Publications: MICRO, Byte, Kilobaud, Personal Computing, Creative Computing, Nibble

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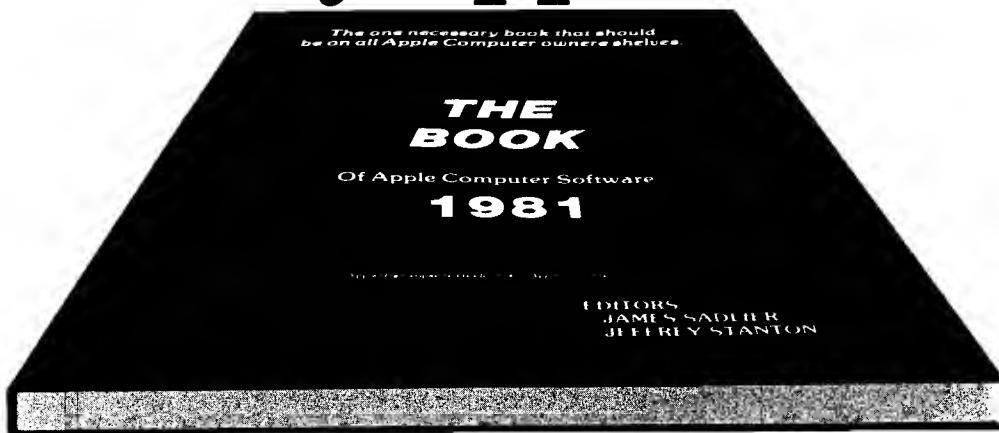
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By Loren Wright

Numbering of BASIC Versions

There seems to be a bit of confusion on the numberings of BASIC versions. One popular numbering system for the BASICs is the one I have been following: 2.0, 3.0, and 4.0. However, the one used by Commodore is a little different. The original BASIC (the "old" ROM's) is called 1.0. The "upgrade" version, produced until recently, is 2.0, and now we have 4.0. I will use the latter convention from now on, and will edit manuscripts published in MICRO accordingly.

All 80-column machines have 4.0 ROMs, as do recent production 40-column machines. These new 40-column machines are called 4016 and 4032, but the actual circuit board is still the same. Some of the enclosures have plastic tops, apparently enlarged to accommodate a disk drive. The disk drive idea doesn't seem to have caught on, but I expect we'll be seeing more and more plastic tops. Also, boards continue to be delivered with holes drilled in the traces of 4016 PC boards where the second row of RAM chips would go. This is to prevent users or unscrupulous dealers from making a cheap and easy memory upgrade.

There is an upgrade kit to go from 2.0 to 4.0 BASIC, and you could even go from 24-pin 1.0 ROMs to 4.0 if you had another socket to install the eighth chip. As far as I know, there is no 28-pin (6540) upgrade kit.

There are several good reasons to upgrade—faster garbage collection and more powerful disk commands, for instance. All but the most serious programmers will stay with what they have. After all, the old ROMs weren't so bad were they?

Toward Universal PET Programs

MICRO will continue to publish articles for all three BASIC ROM sets, and for both disk operating systems, but as I mentioned in a previous column, articles that apply to all three are much preferred.

I call your attention to "PRINT USING for the PET" by David Malmberg in this issue. Not only has he reworked an excellent Apple program for the PET, but he has also accommodated all three PET ROM sets. This involved knowing the right page-zero locations and system calls for each ROM set. These are available from the memory maps and entry point lists published by Jim Butterfield in *Compute* and *The Transactor*. Malmberg also uses the contents of 50003 to identify which BASIC is being used: 0—1.0; 1—2.0; 160—4.0. Because the numbers involved are easy to remember, this is fast becoming a standard technique. Some other frequently-used locations that vary from BASIC to BASIC are given in table 1.

Page zero locations tend to be the same in BASIC 2.0 and 4.0, but in 1.0 they are completely different. PET system calls have different addresses, but generally they work similarly in each BASIC. Malmberg's BASIC program will run on any PET or CBM machine without modification.

80-Column Functions

The 80-column function table that appeared in last month's column contained some errors. The corrected version, with a couple of additions, is shown in table 2.

The window feature on the 80-column machines can be very powerful. It confines user input (and the computer's attention) to a restricted area of the screen. The SET TOP and SET BOTTOM commands fix the upper left and lower right corners of the window. The window may also be defined by POKEing four values into memory for the four edges:

| | Address | Range |
|--------|---------|------------|
| TOP | 224 | 0 to 24 |
| BOTTOM | 225 | TOP to 24 |
| LEFT | 226 | 0 to 79 |
| RIGHT | 213 | LEFT to 79 |

The window may be cleared by printing or striking on the keyboard two successive HOMEs.

Table 1

| | 1.0 | 2.0 | 4.0 |
|------------------------------------|---------|--------|--------|
| 1) End of memory pointer | 134,135 | 52,53 | 52,53 |
| 2) # characters in keyboard buffer | 525 | 158 | 158 |
| 3) Disable STOP key POKE | 537,136 | 144,49 | 144,88 |
| 4) Enable STOP key POKE | 537,133 | 144,46 | 144,85 |

Table 2

| Function | ASCII | Reverse Field Character | Keyboard Combination |
|----------------------------|-------|-------------------------|----------------------|
| BELL | 7 | g | |
| DELETE LINE | 21 | u | ESC, RVS, K |
| ERASE to BEGINNING of line | 150 | V | LS, ←, 3 |
| ERASE to END of line | 22 | v | ←, Q, 4 |
| GRAPHICS screen | 142 | N | LS, RS |
| INSERT line | 149 | U | SH, ESC, RVS, K |
| SCROLL DOWN | 153 | Y | LS, ESC, K |
| SCROLL UP | 25 | y | |
| SET BOTTOM | 143 | O | SH, Z, A, L |
| SET TOP | 15 | o | Z, A, L |
| SET TAB/CLEAR TAB | 137 | I | SH, TAB |
| TAB | 9 | i | TAB |
| TEXT screen | 14 | n | |

SH = either shift

LS = left shift

RS = right shift

All digits are on the numeric keypad, not the main keyboard.

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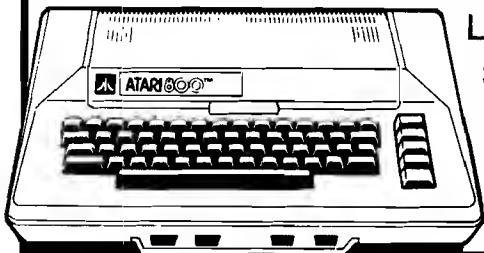
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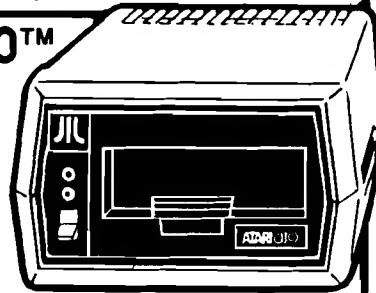
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Add a Light Pen to your Micro

This article includes the hardware details necessary to install a light pen on any 6502 system. Software is included for an OSI implementation.

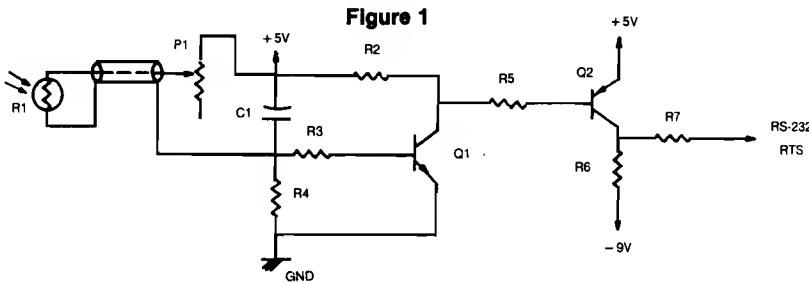
Peter Alan Koski
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Many computer installations today offer alternate forms of user I/O other than the standard CRT/keyboard combination. Among these is the light pen. In using a light pen, the user, if choosing from a menu for example, simply points the pen at what he desires. When locating a point on a grid, the user simply locates the point using the pen, rather than inputting coordinates through the keyboard.

Although the user may find this simplification of input fabulous, for the programmer there exists a lot of overhead. The programmer must keep track of where the information is located on the screen as the program progresses, and how the information changes during program execution.

Principles of Operation

In theory, the operation of a light pen is extremely straightforward. When a request is made to locate the pen, a distinguishable token is swept across the display until the pen recognizes its presence. At that time, if we know where the token is, we also know where the pen is. Simple as this may seem, the hardware and software doesn't always follow suit on simplicity. On graphics systems where there is often a stand-alone microprocessor to control the terminal functions, the "token" is the raster sweep. This is



Bill of Materials

- R1 — photo-resistor (see text)
- R2 — 1.8K
- R3 — 18K
- R4 — 120K
- R5 — 10K
- R6 — 470
- R7 — 470
- Q1 — 2N5300 [RS 276-2009]
- Q2 — 2N5226 [RS 276-2032]
- C1 — .005 uF
- P1 — 100K PC-type potentiometer

Table 1

| | | | | | | | |
|------------|------------|------------|------------|------------|------------|------------|------------|
| 0 D000 | 1 D008 | 2 D010 | 3 D018 | 4 D020 | 5 D028 | 6 D030 | 7 D038 |
| 8 D100 | 9 D108 | 10 D110 | 11 D118 | 12 D120 | 13 D128 | 14 D130 | 15 D138 |
| 16 D200 | 17 D208 | 18 D210 | 19 D218 | 20 D220 | 21 D228 | 22 D230 | 23 D238 |
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probably the most sophisticated and elegant approach since the resolution is extremely high and the scan is invisible to the user.

I have taken a much more simplified approach. Rather than search the entire screen for the pen's location, I request verification at given screen locations. With this approach, the token must be displayed on the screen in order for the pen to see it. Since the standard scan rate for a monitor is 1/60 second, we have to display the token and then wait the required 1/60 second to guarantee that the token reaches the display. Obviously if we were to poll 2048 display locations, the time required wouldn't make this practical.

Hardware

Figure 1 and the accompanying "bill of materials" presents the design for the light pen circuit I am using. The sensor used is a small Calectro photo-resistor mounted in a magic marker casing. The choice of the photo-resistor over a photo-transistor was based on spectrum sensitivity. Photo-transistors that I found were not responsive to a phosphorus source. The photo-resistor was, so the choice was obvious.

The light/dark conditions are reflected via an RS-232 line which is toggled between +5 and -9 volts. RS-232 was chosen as the communications link since I have an RS-232 port on my machine (as do most). By using the light pen to drive the RTS line on the port, I can monitor the status of the pen by monitoring the status word of the ACIA. The pen's condition will be found at the RTS bit.

The circuit goes together nicely on a small piece of perf-board. The interconnecting line used is a piece of miniature shielded micro-phone cable. There shouldn't be any problem assembling the circuit and all that remains is to adjust the light pen to match the CRT used.

A BASIC routine can be used to initially align the pen. While printing the contents of the status port, adjust the monitor's brightness/contrast and P1 of the light pen circuit. A point should be found so that touching the pen to an illuminated position will cause the RTS bit to be set low ("0"), a dark position should set the RTS bit high ("1"). It should be possible to find a position which is comparable to normal viewing intensity.

```

0800      1 ;*****
0800      2 ;*
0800      3 ;* LIGHT PEN QUADRANT QUERY *
0800      4 ;* ROUTINE
0800      5 ;*
0800      6 ;* PETER A. KOSKI
0800      7 ;*
0800      8 ;*****
0800      9 ;
0800     10 ;
3280     11 ORG $3280
3280     12 PENWRD EQU $FC00
3280 206C33 13 JSR GETBLK
3283     14 ;
3283     15 ;GET USR ARGUMENT (QUADRANT NUMBER) -- INSU
RE
3283     16 ;THAT THE VALUE IS ONLY 0 - 63
3283     17 ;
3283 A5B2 18 LDA $B2
3285 293F 19 AND #$00111111
3287 A8 20 TAY ;GET ADDR LOOKUP
OFFSET
3288     21 ;
3288     22 ;LOAD BASE ADDRESS INTO STORE/BLANK/SCAN/RE
STR
3288     23 ;ROUTINES
3288     24 ;
3288 B9BA33 25 LDA LOADDR,Y
328B 8DBB32 26 STA STORE+1
328E 8DC332 27 STA BLANK+1
3291 8D0233 28 STA SCRNL+1
3294 8D3D33 29 STA RESTRE+1
3297     30 ;
3297 B97A33 31 LDA HIADDR,Y
329A 8DBC32 32 STA STORE+2
329D 8DC432 33 STA BLANK+2
32A0 8D0333 34 STA SCRNL+2
32A3 8D3E33 35 STA RESTRE+2
32A6     36 ;
32A6     37 ;INITIALIZE ADDRESSES FOR SAVE BUFFER
32A6     38 ;BUFFER STARTS AT $337E
32A6     39 ;
32A6 A97A 40 LDA #$7A
32A8 8DBE32 41 STA SCRNL+1
32AB 8D3A33 42 STA SCRNL+2
32AE A933 43 LDA #$33
32B0 8DBF32 44 STA SCRNL+2
32B3 8D3B33 45 STA SCRNL+2
32B6     46 ;
32B6     47 ;SAVE BLOCK DATA/BLANK (DARKEN) SELECTED
32B6     48 ;QUADRANT
32B6     49 ;
32B6 A000 50 LDY #00
32B8 A200 51 SAVE LDX #00
32BA BDFFFF 52 STORE LDA $FFFF,X
32BD 8DFFFF 53 SCRNL STA $FFFF , ;SAVE CHAR IN BU
FFER
32C0 A920 54 LDA #$20
32C2 9DFFFF 55 BLANK STA $FFFF,X
32C5 EEEB32 56 INC SCRNL+1
32C8 D003 57 BNE NOCRYL
32CA EEBF32 58 INC SCRNL+2
32CD E8 59 NOCRYL INC
32CE E008 60 CPX #08 , ;8 CHAR/LINE/QUA
D
32D0 D0E8 61 BNE STORE
32D2 C8 62 INY
32D3 C004 63 CPY #04 , ;4 LINE/QUAD
32D5 F01A 64 BEQ OUT1
32D7 ADDB32 65 LDA STORE+1
32DA 18 66 CLC
32DB 6940 67 ADC #$40
32DD 8DBB32 68 STA STORE+1
32E0 8DC332 69 STA BLANK+1
32E3 ADBC32 70 LDA STORE+2
32E6 6900 71 ADC #00
32E8 8DBC32 72 STA STORE+2
32EB 8DC432 73 STA BLANK+2 , ;GET NEXT LINE A
DDR
32EE 4CB832 74 JMP SAVE
32F1    75 ;

```

Software

The two routines presented here are essentially identical except for the resulting resolution. Both are called via the BASIC USR function. The longer of the two routines accepts argument values from 0-63, the number corresponding to the screen quadrant to be queried. Table 1 shows the quadrant numbering scheme. The address associated with each quadrant is the address of the upper left memory location in the quadrant. Quadrants run eight locations horizontally and four locations vertically, or 32 locations total. Thus, touching the pen to any of these locations will score a hit. A hit is returned to BASIC as a 1 from the USR function, a miss is returned as a 0. This routine is thus most useful when resolution is not critical, such as for menu selection.

The single-cell query routine polls individual memory locations and thus provides 64×32 resolution. The argument of the USR function should be the requested memory address, less 32768. (BASIC only allows signed 15-bit arguments.) The return value is the same as the previous: 1 if hit, 0 if miss.

Both routines use the same idea in polling the requested position. The information at the quadrant or single cell is first saved and replaced by OSI graphics character \$20 [blank]. If the pen is presently looking at a dark location, we *might* have its position. If not, we replace the data and return a miss. Should the pen be dark, we replace the \$20 with \$A1 [full illumination character]. At this point, if the pen sees a transition to light, we are at the correct position and return a hit after restoring the data. Had the transition not been seen by the pen, we obviously were not at the right location, and would return a miss.

Programming with a Light Pen

When using the light pen, screen locations become very critical, thus careful formatting should be used through the memory map supplied by OSI. Remember that when using standard input and print statements, the screen has a tendency to scroll. Fortunately, this can be avoided by disabling the line feed. POKE 9644,42 will disable the scroll, POKE 9644,98 will re-enable the scroll routine.

(continued on page 63)

```

32F1      76 ;SEE IF LIGHT PEN WENT DARK
32F1      77 ;
32F1 206F33 78 OUT1   JSR TVDLA      ;1/60 S. SCAN DE
LAY
32F4      79 ;
32F4 AD00FC 80 LDA PENWRD
32F7 2908  81 AND #$00001000
32F9 F037  82 BEQ NOTFND      ;DARK PEN SETS R
TS
32FB      83 ;
32FB      84 ;PEN IS DARK/ENABLE QUADRANT AND SEE IF
32FB      85 ;PEN SEES CHANGE
32FB      86 ;
32FB A000  87 LDY #00
32FD A200  88 ENABLE LDX #00
32FF A9A1  89 LDA #$A1      ;WHITE SQUARE CH
AR.
3301 9DFFFF 90 SCRNL STA $FFFF,X
3304 E8    91 INX
3305 E408  92 CPX $08
3307 D0F8  93 BNE SCRNL
3309 C8    94 INY
330A C004  95 CPY #04
330C F014  96 BEQ OUT2      ;ENTIRE QUAD ENA
BLED
330E AD0233 97 LDA SCRNL+1
3311 18    98 CLC
3312 6940  99 ADC #$40
3314 8D0233 100 STA SCRNL+1
3317 AD0333 101 LDA SCRNL+2
331A 6900  102 ADC #00
331C 8D0333 103 STA SCRNL+2
331F 4CFD32 104 JMP ENABLE      ;ADDR OF NEXT LI
NE
3322      105 ;
3322      106 ;CHECK TO SEE IF PEN SEES ENABLED QUADRANT
3322      107 ;
3322 206F33 108 OUT2   JSR TVDLA      ;1/60 S. SCAN DE
LAY
3325      109 ;
3325 AD00FC 110 LDA PENWRD
3328 2908  111 AND #$00001000
332A D006  112 BNE NOTFND      ;HI PEN DISABLES
RTS
332C      113 ;
332C      114 ;RETURN CODE FOR PEN:
332C      115 ;1 TO BASIC = PEN WAS IN QUADRANT
332C      116 ;0 TO BASIC = PEN WAS NOT IN QUAD
332C      117 ;
332C A901  118 LDA #01
332E 48    119 PHA      ;SAVE RETURN COD
E ON STACK
332F 4C3533 120 JMP REPLCE
3332      121 ;
3332 A900  122 NOTFND LDA #00
3334 48    123 PHA      ;SAVE RETURN COD
E ON STACK
3335      124 ;
3335      125 ;RESTORE ORIGINAL DATA FOUND AT QUADRANT
3335      126 ;
3335 A000  127 REPLCE LDY #00
3337 A200  128 RPLCE LDX #00
3339 ADFFFF 129 SCRNL2 LDA $FFFF,X
333C 9DFFF 130 RESTRE STA $FFFF,X
333F EE3A33 131 INC SCRNL2+1
3342 D003  132 BNE NOCRY2
3344 EE3B33 133 INC SCRNL2+2
3347 E8    134 NOCRY2 INX
3348 E008  135 CPX #08
334A D0ED  136 BNE SCRNL2
334C C8    137 INY
334D C004  138 CPY #04
334F F014  139 BEQ OUT3
3351 AD3D33 140 LDA RESTRE+1
3354 18    141 CLC
3355 6940  142 ADC #$40
3357 8D3D33 143 STA RESTRE+1
335A AD3E33 144 LDA RESTRE+2
335D 6900  145 ADC #00

```

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| | | |
|-------------|-----|---|
| 335F 8D3E33 | 146 | STA RESTRE+2 |
| 3362 4C3733 | 147 | JMP RPLCE |
| 3365 | 148 | ; |
| 3365 | 149 | ;RETURN TO BASIC CALLING ROUTINE |
| 3365 | 150 | ; |
| 3365 68 | 151 | OUT3 PLA ;POP RETURN CODE |
| 3366 A8 | 152 | TAY |
| 3367 A900 | 153 | LDA #00 |
| 3369 6C0800 | 154 | JMP (08) RTS |
| 336C | 155 | ; |
| 336C 6C0600 | 156 | GETBLK JMP (06) |
| 336F | 157 | ; |
| 336F | 158 | ;TV SCAN DELAY |
| 336F | 159 | ; |
| 336F A040 | 160 | TVDLA LDY #\$40 |
| 3371 A2FF | 161 | LOOP1 LDX #\$FF |
| 3373 CA | 162 | LOOP2 DEX |
| 3374 D0FD | 163 | BNE LOOP2 |
| 3376 88 | 164 | DEY |
| 3377 D0F8 | 165 | BNE LOOP1 |
| 3379 60 | 166 | RTS |
| 337A | 167 | ; |
| 337A | 168 | ;QUADRANT CHARACTER HOLD BUFFER |
| 337A | 169 | ; |
| 337A | 170 | BUFFER EQU *+32 |
| 337A | 171 | ; |
| 337A | 172 | ;ADDRESS LOOK UP TABLE FOR 64 GIVEN QUADRAN |
| TS | | |
| 337A | 173 | ; |
| 337A D0D0D0 | 174 | HIADDR HEX D0D0D0D0D0D0D0D0 |
| 337D D0D0D0 | | |
| 3380 D0D0 | | |
| 3382 D1D1D1 | 175 | HEX D1D1D1D1D1D1D1 |
| 3385 D1D1D1 | | |
| 3388 D1D1 | | |
| 338A D2D2D2 | 176 | HEX D2D2D2D2D2D2D2 |
| 338D D2D2D2 | | |
| 3390 D2D2 | | |
| 3392 D3D3D3 | 177 | HEX D3D3D3D3D3D3D3 |
| 3395 D3D3D3 | | |
| 3398 D3D3 | | |
| 339A D4D4D4 | 178 | HEX D4D4D4D4D4D4D4 |
| 339D D4D4D4 | | |
| 33A0 D4D4 | | |
| 33A2 D5D5D5 | 179 | HEX D5D5D5D5D5D5D5 |
| 33A5 D5D5D5 | | |
| 33A8 D5D5 | | |
| 33AA D6D6D6 | 180 | HEX D6D6D6D6D6D6D6 |
| 33AD D6D6D6 | | |
| 33B0 D6D6 | | |
| 33B2 D7D7D7 | 181 | HEX D7D7D7D7D7D7D7 |
| 33B5 D7D7D7 | | |
| 33B8 D7D7 | | |
| 33BA 000810 | 182 | ; |
| 33BD 182028 | 183 | LOADADDR HEX 0008101820283038 |
| 33C0 3038 | | |
| 33C2 000810 | 184 | HEX 0008101820283038 |
| 33C5 182028 | | |
| 33C8 3038 | | |
| 33CA 000810 | 185 | HEX 0008101820283038 |
| 33CD 182028 | | |
| 33D0 3038 | | |
| 33D2 000810 | 186 | HEX 0008101820283038 |
| 33D5 182028 | | |
| 33D8 3038 | | |
| 33DA 000810 | 187 | HEX 0008101820283038 |
| 33DD 182028 | | |
| 33E0 3038 | | |
| 33E2 000810 | 188 | HEX 0008101820283038 |
| 33E5 182028 | | |
| 33E8 3038 | | |
| 33EA 000810 | 189 | HEX 0008101820283038 |
| 33ED 182028 | | |
| 33F0 3038 | | |
| 33F2 000810 | 190 | HEX 0008101820283038 |
| 33F5 182028 | | |
| 33F8 3038 | | |

```

0800    1 ;*****
0800    2 ;*
0800    3 ;* SINGLE VIDEO CELL QUERY *
0800    4 ;* ROUTINE
0800    5 ;*
0800    6 ;* PETER A KOSKI *
0800    7 ;*
0800    8 ;*****
0800    9 ;
3280   10 ORG $3280
3280   11 OBJ $800
3280   12 PENWRD EQU $FC00
3280 20C432 13 JSR GETBLK
3283   14 ;
3283   15 ; TURN USR ARGUMENT INTO 6502 ADDRESS
3283   16 ;
3283 A5B2 17 LDA $B2
3285 48 18 PHA
3286 A5B1 19 LDA $B1
3288 0980 20 ORA #$10000000
328A 85B2 21 STA $B2
328C 68 22 PLA
328D 85B1 23 STA $B1
328F   24 ;
328F A200 25 LDX #00
3291   26 ;
3291   27 ;SAVE CHARACTER AT CELL AND DARKEN
3291   28 ;SELECTED CELL
3291   29 ;
3291 A1B1 30 LDA ($B1,X)
3293 48 31 PHA ;SAVE CHAR ON ST
ACK
3294 A920 32 LDA #$20
3296 81B1 33 STA ($B1,X)
3298   34 ;
3298   35 ;SEE IF LIGHT PEN WENT DARK
3298   36 ;
3298 20C732 37 JSR TVDLA ,1/60 S. SCAN DE
LAY
329B AD00FC 38 LDA PENWRD
329E 2908 39 AND #$00001000
32A0 F018 40 BEQ NOTFND ;DARK PEN SETS R
TS
32A2   41 ;
32A2   42 ;PEN IS DARK / ENABLE CELL AND CHECK IF
32A2   43 ;PEN SEES TRANSITION
32A2   44 ;
32A2 A9A1 45 LDA #$A1 ;WHITE SQUARE CH
AR.
32A4 81B1 46 STA ($B1,X)
32A6   47 ;
32A6   48 ;CHECK TO SEE IF PEN SAW ENABLED CELL
32A6   49 ;
32A6 20C732 50 JSR TVDLA ;1/60 S. SCAN DE
LAY
32A9   51 ;
32A9 AD00FC 52 LDA PENWRD
32AC 2908 53 AND #$00001000
32AE D00A 54 BNE NOTFND ;HI PEN DISABLES
RTS
32B0   55 ;
32B0   56 ;RETURN CODE FOR PEN:
32B0   57 ;1==PEN WAS AT CELL
32B0   58 ;0==PEN WAS NOT AT CELL
32B0   59 ;
32B0 68 60 PLA ;GET CELL'S CHAR
ACTER
32B1 81B1 61 STA ($B1,X)
32B3 A900 62 LDA #00
32B5 A001 63 LDY #01
32B7 6C0800 64 JMP (08)
32BA   65 ;RTS -- BASIC
32BA   66 ;
32BA 68 67 NOTFND PLA ;GET CELL'S CHAR
ACTER
32BB 81B1 68 STA ($B1,X)
32BD A900 69 LDA #00
32BF A000 70 LDY #00
32C1 6C0800 71 JMP (08)
32C4   72 ;RTS -- BASIC

```

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```

32C4      73   ;
32C4 6C0600 74   GETBLK JMP (06)
32C7      75   ;
32C7      76   ;DELAY TO ALLOW FOR STANDARD TV SCAN
32C7      77   ;
32C7 A000  78   TVDLA LDY #00
32C9 A200  79   LOOP1 LDX #00
32CB E8    80   LOOP2 INX
32CC D0FD  81   BNE LOOP2
32CE C8    82   INY
32CF C040  83   CPY #$40
32D1 D0F6  84   BNE LOOP1
32D3 60    85   RTS

```

```

950 REM ****
952 REM *
954 REM * LIGHT PEN DEMONSTRATION *
956 REM * BY PETER A KOSKI *
958 REM *
960 REM ****
1004 REM CALL IN SCREEN CLEAR ROUTINE
1005 REM
1006 DISK!"CALL 3280=31,3"
1010 POKE 574,128: POKE 575.50
1020 X=USR(X)
1021 REM
1022 REM LOAD SELECTION DATA ONTO SCREEN
1023 REM
1030 PRINT "          == ELEMENTARY MATH LIGHT PEN DEMO =="

1040 PRINT : PRINT : PRINT
1050 PRINT " 0   1   2   3   4   5   6   7
8";
1060 PRINT "      9"
1070 PRINT : PRINT : PRINT : PRINT
1080 PRINT "      +   -   *   /"
1090 PRINT : PRINT : PRINT : PRINT . PRINT
2000 REM
2010 REM     RUN THE PROGRAM USING SUBROUTINES
2020 REM
2021 REM     CALL IN SINGLE CELL QUERY ROUTINE
2022 REM
2025 DISK!"CALL 3280=31,2":RPT=0
2030 GOSUB 3000:A1=NUM
2040 GOSUB 4000:0=OP:RPT=RPT+1
2050 GOSUB 3000:A2=NUM
2060 ON 0 GOTO 2100,2200,2300,2400
2100 ANS=A1+A2
2110 GOTO 2500
2200 ANS=A1-A2
2210 GOTO 2500
2300 ANS=A1*A2
2310 GOTO 2500
2400 ANS=A1/A2
2500 REM
2510 REM     PRINT OUTPUT
2520 REM
2530 POKE 9644,42: REM DISABLE SCROLL ON PRINT
2600 PRINT " THE RESULT IS ";ANS
2605 FOR PS=1 TO 200:PS= ABS (PS): NEWT PS
2620 PRINT "
2625 IF RPT=5 THEN 5000
2630 GOTO 2030
3000 REM
3010 REM     NUMERIC INPUT (SINGLE DIGITS)
3020 REM
3025 NUM=0:CNT=0
3030 FOR CELL=54402 TO 54458 STEP 6

```

```

3040 NUM=USR(CELL-32768)
3050 IF NUM=1 THEN NUM=cnt: RETURN
3060 CNT=CNT+1
3100 NEXT CELL
3110 CNT=0
3120 GOTO 3030
4000 REM
4010 REM OPERATOR INPUT
4020 REM
4025 CNT=1
4030 FOR CELL=54730 TO 54760 STEP 10
4040 OP=USR(CELL-32768)
4045 IF OP=1 THEN OP=cnt: RETURN
4046 CNT=cnt+1
4050 NEXT CELL
4100 GOTO 4025
5000 REM
5010 REM ANOTHER 5 ROUNDS ?
5020 REM
5021 REM CALL IN SCREEN CLEAR
5022 REM
5030 DISK!"CALL 3280=31,3
5040 X=USR(X)
5045 REM
5046 REM CALL IN QUADRANT QUERY ROUTINE
5047 REM
5050 DISK!"CALL 3280=31,1
5060 POKE 9644,98: REM RE-ENABLE SCROLL
5065 REM
5066 REM DISPLAY QUESTION/INPUT SELECTION
5067 REM
5070 PRINT " WOULD YOU LIKE ANOTHER GO AT IT ?"
5080 PRINT : PRINT : PRINT : PRINT
5090 PRINT " YES NO"
5100 PRINT : PRINT
5110 IF USR(49)=1 THEN 950
5120 IF USR(52)=1 THEN 6000
5130 GOTO 5110
6000 REM
6010 REM EXIT TO BASIC
6020 REM
6030 DISK!"CALL 3280=31,3
6040 X=USR(X)
6050 END

```

Other thoughts to keep in mind, especially if taking input from a graph, is that the pen can move only to a block adjacent to the one where it is presently. Thus, once the original position is known, the next move can only be one of, at most, eight positions. The accompanying demonstration program should help to explain. The two routines and a screen clear are on track 31 in this example, and are all called into \$3280 for execution. The quadrant routine is on sector 1, the individual cell routine on sector 2, and the screen clear code on sector 3. The program is a simple arithmetic demo. Single-digit arguments and operators are input via the light pen and the result is printed to the screen without line feed. After five repetitions, the program asks the user if he would like another session. Again, the yes/no response is accepted through the light pen.

Conclusion

Although the routines presented were written for an OSI mini-floppy system, any 6502 system supporting memory mapped video should be able to employ them. The only changes to be made are the addresses of the display block and of the ACIA.

One last thought for disk owners—a menu or display block which is repeatedly used at various points of the program may be held resident on a disk track and then CALLED to \$D000. As you'll discover, speed plays an important part in light pen I/O, since the time spent for input is nil. The processing and output must therefore be as streamlined as possible in developing an efficient system.

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Integer BASIC Internals

Here's a sorted list of Apple Integer BASIC memory locations and routines, with some examples of how to use them.

Glenn R. Sogge
P.O. Box 203
Evanston, Illinois 60204

Apple Computer Co. has released to its dealers a set of application and information notes that are quite informative. Included in the package is a listing of memory locations and routines used by Integer BASIC. The table with this article is a numerically sorted (by hex address) listing of this information. Also included are the corresponding decimal equivalents of the addresses and a little information about the routines. In general, routines without descriptions are the handlers for the functions named.

Hardly any information is given about how the routines are called or are used but with a little digging I'm sure you can figure out how to use at least a few of these in your own programs. At least, you now know where to begin looking. For example, the routine at \$E51B ("HEX/DEC") converts the

16-bit number contained in the X [lo] and A [hi] registers to a decimal number from 0-65535 and prints it out.

The routine at \$EE68 prints out the "**** RANGE ERR" message and the routine at \$E36B prints out the "**** MEM FULL ERR" message. A couple of useful tricks are also mentioned in the Apple material.

1. To find the absolute address of a given line, place the line number [in hex] into locations \$CE-\$CF (lo and hi). Then jump to address \$E56D (*E56DG); the absolute address will be returned in locations \$E4-\$E5 (lo and hi).

2. To execute a GOTO from the monitor, put the absolute address of the line (found by the above procedure) into \$C6-\$C7 and put a negative byte into the mode location [eg., \$80 into \$D9—a negative value indicates run mode, a positive one indicates immediate mode]. Then jump to \$E867 (*E867G) and you will be back in BASIC running at that line.

This item was picked up from a bulletin board here in Chicago and is from Mark Pump.

"If you've ever accidentally pressed RESET while an Integer BASIC program was running, this is for you. In the monitor, enter:

*E3E3G

and the statement number which was last executed is displayed. Press RESET again and re-enter DOS with *3D0G. This method can also be used to find the statement number of an outstanding Integer BASIC input statement. When the input prompt occurs, press RESET and *E3E3G to find the statement number. Exiting the program with control-C will not show the statement number if an input statement was active."

You should also notice that there seems to be some discrepancy between the list of page zero locations used given in the list and the chart on page 75 of the new Apple II Reference Manual (the white book). According to the chart, locations \$E0-\$FF are not used by Integer BASIC but the detailed list shows this to be incorrect. Some of those locations are indeed used by BASIC! Also, some locations are used for a couple of things, depending on the routine in command, so the values might not always be what you would expect.

| STB REPORT FOR REC#: | HEX | DEC | NAME | DESCR | HEX | DEC | ACL | GEN'L ACC LO |
|----------------------|-----------|---------|-----------|----------------------|-----------|---------|-----------|---------------------------|
| | 004A | 74 | LOMEML | LOW MEMORY LO | 00CE | 206 | VALGETL | PRIMARY EVAL TEMP LO |
| | 004B | 75 | LOMEMH | LOW MEMORY HI | 00CE-00CF | 206-207 | VAL | 16-BIT TEMP FOR MATH |
| | 004C | 76 | HIMEML | HIGH MEMORY LO | 00CF | 207 | VALGETH | PRIMARY EVAL TEMP HI |
| | 004D | 77 | HIMEMH | HIGH MEMORY HI | 00D0 | 208 | ACH | GEN'L ACC HI |
| | 004E | 78 | RNDL | RANDOM # LO | 00D1 | 209 | SRCHL | PTR FOR SEARCH VAR TBL LO |
| | 004F | 79 | RNDH | RANDOM # HI | 00D1-00F0 | 209-240 | SRCHH | PTR FOR SEARCH VAR TBL HI |
| | 0050-006F | 80-111 | NOUNSTKL | NOUN STACK LO | 00D2 | 210 | TOKNDXSTK | TOKEN INDEX STACK |
| | 0050-0077 | 88-119 | SYNSTKH | SYNTAX STACK HI LOCS | 00D3 | 211 | SRCH2L | VAR TAB SEARCH PTR2 LO |
| | 0078-0097 | 120-151 | NOUNSTKH | NOUN STACK HI | 00D4 | 212 | SRCH2H | VAR TAB SEARCH PTR2 HI |
| | 0080-009F | 128-159 | SYNSTKL | SYNTAX STACK LO LOCS | 00D5 | 213 | 1FSH IP | IF ? THEN FAIL FLAG |
| | 00A0-00BF | 160-191 | NOUNSTKC | NOUN STACK COUNTER | 00D6 | 214 | CRFLAG | CARR RTN FLAG |
| | 00A8-00C7 | 168-199 | TXTNDXSTK | TEXT INDEX STACK | 00D7 | 215 | VERBNOW | CURR VERB IN USE |
| | 00C8 | 200 | TXINDX | TEXT INDEX VALUE | 00D8 | 216 | PRINOW | PRINT IT NOW FLAG |
| | 00C8 | 200 | OUTVAL | OUTPUT VAL TEMP | 00D9 | 217 | XSAVE | TEMP FOR X-REG |
| | 00C9 | 201 | YTEMP | TEMP FOR Y-REG | 00DA | 218 | RUNMODE | RUN MODE FLAG |
| | 00C9 | 201 | LEADBL | LEADING BLANKS INDEX | 00DB | 219 | AUXL | AUX CNTR LO |
| | 00CA | 202 | PPL | PGM PTR LO | 00DC | 220 | AUXH | AUX CNTR HI |
| | 00CB | 203 | PPH | PGM PTR HI | 00DD | 221 | PRL | CURR LN VAL LO |
| | 00CC | 204 | PVL | CURR VAR PTR LO | 00DE | 222 | PRH | CURR LN VAL HI |
| | 00CD | 205 | PVH | CURR VAR PTR HI | 00DF | 223 | PNL | CURR NOUN PTR LO |
| | | | | | | | PNH | CURR NOUN PTR HI |

(continued)

| | | | | | | | |
|-----------|---------|-------------|---------------------------------|-----------|-------------|------------|-------------------------------|
| 00E0 | 224 | PXL | CURR VERB PTR LO | E7E2 | -6174 | AUTO | AUTO LINE # |
| 00E1 | 225 | PXH | CURR VERB PTR HI | E828 | -6104 | IF/THEN | IF ? THEN ROUTINE |
| 00E2 | 226 | P1L | AUX PTR1 LO | E83C | -6061 | GOSUB | |
| 00E3 | 226 | DELL | DELETE LN PTR LO | E858 | -6056 | GOTO | |
| 00E3 | 227 | DELH | DELETE LN PIR HI | E8A7 | -6041 | GOLINE | GOTO LINE ADDR IN \$C6-C7 |
| 00E3 | 227 | P1H | AUX PTR1 HI | E875 | -6027 | GETNEXT | FETCH NEXT TEXT STATEMENT |
| 00E4 | 228 | FLAC | GEN'L FLAG BYTE | E8A5 | -5979 | RETURN | |
| 00E4 | 228 | P2L | AUX PTR2 LO | E8C3 | -5949 | STOPPED AT | PRINT 'STOPPED AT LINE #' |
| 00E4 | 228 | LNAL | LINE # ADDR LO | E8D6 | -5930 | NEXT | NEXT END LOOP |
| 00E5 | 229 | LNAH | LINE # ADDR HI | E93A | -5810 | FOR | FOR INITIAL ENTRY |
| 00E5 | 229 | P2H | AUX PTR2 HI | E950 | -5808 | TO/FOR | LOOP CTR # TO \$ STEP # |
| 00E6 | 230 | NXTL | NEXT PTR LO | E910-EA87 | -5616 -5497 | VERBADRL | VERB DISPATCH TAB LO |
| 00E6 | 230 | P3L | AUX PTR3 LO | E988-EA8F | -5497 -5377 | VERBADRH | VERB DISPATCH TAB HI |
| 00E7 | 231 | NEXH | NEXT PTR HI | E900-EB99 | -5376 -5223 | MESSTXT | ERROR MESS. TEXT |
| 00E7 | 231 | PSH | AUX PTR3 HI | E8A9 | -5207 | INPUT | INPUT ROUTINE |
| 00F1 | 241 | TOKNDX | TOKEN INDEX VAL | E000-E0FF | -5120 -4607 | SYNTABL | SYNTAX TABLE LIST |
| 00F2 | 242 | CONL | CONTINUE PIR LO | E003 | -4607 | PRNTSTR | PRINT A STRING |
| 00F3 | 243 | CONH | CONTINUE PTR HI | EE22 | -4574 | LEN | |
| 00F4 | 244 | AUTOINCL | AUTO INC VAL LO | E034 | -4556 | GETVAL255 | GET VALUE = 255 |
| 00F5 | 245 | AUTOINCH | AUTO INC VAL HI | EE3F | -4515 | PLOT | |
| 00F6 | 246 | AUTOLNL | CURR AUTO LINE # LO | EE4E | -4508 | COLOR | |
| 00F7 | 247 | AUTOLNH | CURR AUTO LINE # HI | EE54 | -4524 | MAN | |
| 00F8 | 248 | AUTOMODE | AUTO FLAG | EE57 | -4521 | VTAB | |
| 00F9 | 249 | COUNT | GEN'L CNTN BYTE | EE68 | -4504 | RNGERR | PRINTS '*** RANGE ERR' |
| 00F9 | 249 | CHAR | CURR CHAR | EEA0 | -4448 | CALL | CALL A ML SUBR |
| 00FA | 250 | LEADZR | LEADING ZEROS INDEX | EEB0 | -4432 | HLIN | |
| 00FB | 251 | FORNDX | FOR/NEXT LOOP INDEX | E0C6 | -4410 | VLIN | |
| 00FC | 252 | GOSUBNDX | GOSUB INDEX | E0D3 | -4397 | PRINT | PRINT ERROR MSG/BELL |
| 00FD | 253 | SYNSTNIDX | SYNTAX STACK INDEX VAL | EEF6 | -4362 | PEEK | |
| 00FE | 254 | SYNPAGL | SYNTAX PAGE PTR LO | EFO0 | -4352 | GETVAL255 | GET A VALUE FOR 1 BYTE |
| 00FF | 255 | SYNPAGH | SYNTAX PAGE PTR HI | EFO8 | -4344 | POKE | |
| 0200-02FF | 512-767 | INBUFF | INPUT BUFFER | EF10 | -4336 | DIVIDE | |
| E000 | -8192 | CNTLB | COLD ENTRY | EF1E | -4322 | DIMVARB | DIMENSION A VARIABLE |
| E003 | -8189 | CNTLC | WARM ENTRY | EF4E | -4274 | RND | RANDOM # GENERATOR |
| E006 | -8186 | SETPRMP1 | SET UP > PROMPT | EFEC | -4116 | RUN | RUN FROM BEGINNING |
| E02A | -8150 | NXTBYTE | GET NEXT BYTE 16BIT PTR | EFF2 | -4110 | RUN #N | RUN FROM LINE # |
| E04B | -8117 | LIST | LIST ALL | F000 | -4096 | SCRATCH | SCRATCH EVERYTHING |
| E050 | -8099 | LISTXY | LIST A RANGE | F040 | -4019 | HIMEM | |
| E0-D | -8083 | UNPACK | TOKENED CODE TO MNEMONICS | F0C9 | -3895 | LOMEM | |
| E130 | -7888 | DIMSTR | DIMENSION A STRING | F0DF | -3873 | LOAD | LOAD A PGM FROM TAPE |
| E171 | -7823 | INPUTSTR | INPUT A STRING | F11E | -3810 | SETHDR | SETUP HDR FOR SAVE/LOAD PARAM |
| E222 | -7646 | MULT | MULTIPLY | F12C | -3796 | SETBUF | SETUP PGM SAVE/LOAD PARAM |
| E270 | -7558 | MOD | | F140 | -3776 | SAVE | SAVE A PGM TO TAPE |
| E28A | -7542 | SCRN | RETURN SCRN COLOR | F161 | -3743 | PRNTERR | PRINT AN ERROR MESS |
| E283 | -7501 | MAINLINE | MAIN COMPILE/EXEC CODE | F167 | -3737 | POP | |
| E36B | -7317 | MEMFUL | PRINTS '*** MEM FULL ERR' | F171 | -3727 | TRACE | |
| E36F | -7313 | DELETE | DELETE LINES X-Y | F176 | -3722 | NOTRACE | |
| E3C0 | -7232 | ERRORMESS* | INPUT ERROR MSC | F17D | -3715 | TRACEIT | EXEC TRACE FUNC |
| E3CE | -7218 | GETCMD | GET KEYBOARD CMD | F279 | -3463 | STEP | FOR/NEXT STEP FUNC |
| E3E0 | -7200 | ERRORMESS | PRNT ERR MSG GOTO MAINLINE | F2E0 | -3360 | NODSP | |
| E51B | -6885 | HEX/DEC | PRINT VAL (X=LO ACC=HI) 0-65535 | F304 | -3324 | DSP | |
| E56D | -6803 | LINADR | FIND LINE #'S ADDRESS | F30A | -3318 | CON | CONTINUE EXEC |
| E5AD | -6739 | NEW | | F31D | -3299 | ASC | |
| E5B7 | -6729 | CLR | | F33B | -3269 | PDL | |
| E6EC | -6420 | BRANCH | GET LO/HI THEN JSR | F351 | -3247 | RDKEY | READ AN INPUT |
| E6FF | -6401 | GETVERB | NEXT VERB TO USE | F371 | -3215 | EXP ^ | RAISE TO A POWER |
| E715 | -6379 | GET16BIT | GET A 16-BIT VAL | F3C9 | -3127 | PRBS | |
| E736 | -6346 | NOT | | F41A | -3046 | IN#S | |
| E744 | -6326 | ABS | | | | | |
| E75C | -6308 | SGN | | | | | |
| E782 | -6270 | SUBTRACTION | | | | | |
| E785 | -6267 | ADDITION | | | | | |
| E7A1 | -6236 | TAB | | | | | |
| E7C1 | -6207 | COMMA | | | | | |

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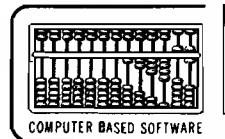
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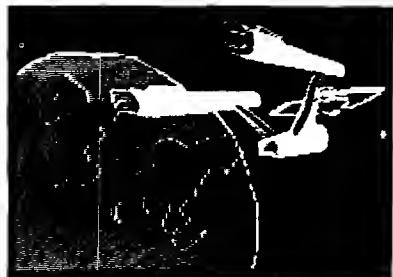
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Atari Error Messages

This program, when included in a BASIC program, will display the English language versions of Atari's number-coded error messages.

David P. Allen
19 Damon Road
Scituate, Massachusetts 02066

Within a few days after putting my Atari computer in operation I wound up with a sore thumb. This was a result of having to continually thumb through the Atari manual to find out the meaning of the latest error message which the Atari was giving me. My threshold of discontent was being depressed lower and lower by the invidious message "ERROR-12 AT LINE 200", which continually thrust me back to the manual to find out just what I had done wrong. I figured there had to be a better way. There is.

Atari BASIC language is equipped with the very handy 'TRAP' function which you can cause to spring into action every time it encounters an error condition. This command tells the computer to go to the line number immediately following the command (such as TRAP 32000) and continue executing the program at that point. The solution to my problem was simply to direct the computer to a list of error messages with instructions to find the right message, and then print it out on the screen in plain English.

Here's the way it works. The error trapping subroutine is started at line 32500, high enough to be included in most programs without getting in the way of the rest of the program. Way up in the beginning, at the earliest line possible (line 0 is a good place) we enter 'DIM SNAP\$(50): TRAP 32500'. This sets up SNAP\$ to collect the error messages ('snap', 'trap', — get it? Oh, well...) and instructs the program to

```
2 PRINT "}: REM CLEARS SCREEN
5 DIM SNAP$(50):TRAP32500
6 REM
7 REM
10 REM <<< ERROR TRAPPING DEMO >>>
20 REM <<< BY DAVID P. ALLEN >>>
30 REM
40 REM
50 REM
60 REM
70 REM
80 REM THIS PROGRAM DEMONSTRATES
90 REM THE PRINTOUT OF ERROR
100 REM STATEMENTS. THE FOLLOWING
110 REM LINES ARE DESIGNED TO PRO-
120 REM DUCE ERRORS. AFTER EACH
130 REM ERROR, TYPE 'GOTO' PLUS THE
140 REM THE LINE NUMBER WHERE THE
150 REM ERROR OCCURRED +10. I.E.,
160 REM IF THE ERROR MESSAGE SAYS
170 REM THE ERROR OCCURRED AT LINE
180 REM 220, THEY TYPE 'GOTO 230' TO
190 REM CONTINUE THE DEMONSTRATION
195 REM
197 REM
200 GOTO 1000
210 NEXT X
220 READ Y
230 SAVE "D2:TEST"
240 PRINT #1,A$
250 PRINT "}: POSITION 5,12
260 PRINT *** END OF DEMONSTRATION ***
270 END
326 LIST 32660
32490 REM <<< ERROR TRAPPING >>>
32491 REM <<< SUBROUTINE >>>
32493 REM
32494 REM
32495 REM INSERT 'DIM SNAP$(50):'
32496 REM TRAP 32500' AT AN
32497 REM EARLY LINE NUMBER.
32498 REM
32499 REM
32500 SNAP = PEEK (195):LNW = 256 * PEE
K (187) + PEEK (186): GOSUB SNAP + 32500:
PRINT "*** ":SNAPS: PRINT "AT LINE ";LNW;""
***"
32501 TRAP32500: PRINT " ": END
32502 SNAPS = "INSUFFICIENT MEMORY": RETU
RN
32503 SNAPS = "VALUE ERROR": RETURN
32504 SNAPS = "TOO MANY VARIABLES": RETUR
N
32505 SNAPS = "STRING LENGTH ERROR": RETU
RN
```

proceed at line 32500 whenever it encounters an error condition. Line 32500 takes a PEEK at two locations which find out first what error occurred [SNAP], and where it occurred [LNM]. The computer then finds the correct error message and prints it out on the screen.

Line 32501 resets the trap and ends the program, but you can have your program continue. If you replace 'END' with 'INPUT A\$: GOTO LNM + 10' your program will pause at the error message while you reflect on the wisdom of what it is telling you, then when you press 'RETURN' the program will jump to the line number that is ten places further down from where the error occurred. To make this work, all your line numbers must be ten numbers apart, and you must 'DIM A\$(1)' back in the beginning of the program. If you leave 'END' in place in line 32501, then you must use 'RUN' or some other immediate command to get things going again.

To save this program for inclusion in your future programs, enter lines 32500 through 32761 into memory through your keyboard. If you are going to save the routine on cassette, then set the program recorder up to record and execute 'LIST "C:' and the whole nine yards will be saved on your tape in tokenized form. To retrieve it for use in another program execute 'ENTER "C:' after cuing up your tape to the right spot for this routine. The error trapping subroutine will then be added to whatever program you have in BASIC memory at that time.

Disk users follow almost the same routine except use 'D:' and a filename where 'C:' is mentioned above. The filename will be the one you use to identify this subroutine on your disk. I use 'ERRSUB.LST' which reminds me that this file was put on the disk with a 'LIST' instead of a 'SAVE'.

That's all there is to it. If you enter the listing contained herein, the line numbers below 32490 will cause a demonstration of the subroutine procedure to be executed. The price you pay for all of this is the use of 1982 bytes of memory. Atari 800 users with 48K of RAM memory will not give this a second thought; Atari 400 users with only 8K will pause and reflect before dedicating almost 2K to the reduction of their irritation. If it fits your program and your memory then try it out. You'll like it.

```

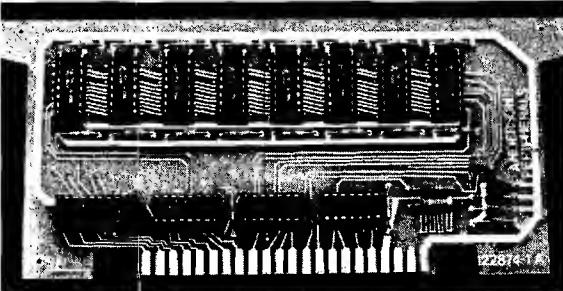
32506 SNAP$ = "OUT OF DATA": RETURN
32507 SNAP$ = "ERROR > 32767": RETURN
32508 SNAP$ = "INPUT STATEMENT ERROR": RE
TURN
32509 SNAP$ = "DIM ERROR": RETURN
32510 SNAP$ = "ARGUMENT STACK OVERFLOW":
RETURN
32511 SNAP$ = "FP OVER/UNDERFLOW ERROR":
RETURN
32512 SNAP$ = "LINE NOT FOUND": RETURN
32513 SNAP$ = "NEXT WITHOUT FOR": RETURN

32514 SNAP$ = "LINE TOO LONG": RETURN
32515 SNAP$ = "GOSUB/FOR LINE DELETED": R
ETURN
32516 SNAP$ = "RETURN WITHOUT GOSUB": RET
URN
32517 SNAP$ = "GARBAGE": RETURN
32518 SNAP$ = "INVALID STRING CHARACTER":
RETURN
32519 SNAP$ = "CAN'T LOAD - TOO LONG": RE
TURN
32520 SNAP$ = "DEVICE # >7 OR =0": RETURN

32521 SNAP$ = "NON-LOAD FILE": RETURN
32628 SNAP$ = "BREAK KEY ABORT": RETURN
32629 SNAP$ = "IOCB ALREADY OPEN": RETURN

32630 SNAP$ = "NON-EXISTENT DEVICE": RETU
RN
32631 SNAP$ = "IOCB WRITE ONLY": RETURN
32632 SNAP$ = "INVALID COMMAND": RETURN
32633 SNAP$ = "DEVICE/FILE NOT OPENED": R
ETURN
32634 SNAP$ = "ILLEGAL IOCB #": RETURN
32635 SNAP$ = "IOCB READ ONLY": RETURN
32636 SNAP$ = "END OF FILE": RETURN
32637 SNAP$ = "RECORD > 256 CHARACTERS":
RETURN
32638 SNAP$ = "DEVICE DOESN'T RESPOND": RE
TURN
32639 SNAP$ = "GARBAGE AT SERIAL PORT": R
ETURN
32640 SNAP$ = "SERIAL BUS INPUT FRAMING E
RROR": RETURN
32641 SNAP$ = "CURSOR OUT OF RANGE": RETU
RN
32642 SNAP$ = "SERIAL BUS DATA FRAME OVER
RUN": RETURN
32643 SNAP$ = "SERIAL BUS DATA CHECKSUM E
RROR": RETURN
32644 SNAP$ = "WRITE PROTECTED": RETURN
32645 SNAP$ = "DISK/SCREEN MODE HANDLER E
RROR": RETURN
32646 SNAP$ = "FUNCTION NOT IMPLEMENTED":
RETURN
32647 SNAP$ = "GRAPHICS MODE NEEDS MORE M
EMORY": RETURN
32660 SNAP$ = "DRIVE NUMBER ERROR": RETUR
N
32661 SNAP$ = "DISK FULL": RETURN
32662 SNAP$ = "DISK FULL": RETURN
32663 SNAP$ = "UNRECOVERABLE SYSTEM DATA
- I/O ERROR": RETURN
32664 SNAP$ = "FILE NUMBER MISMATCH": RETU
RN
32665 SNAP$ = "FILENAME ERROR": RETURN
32666 SNAP$ = "POINT DATA LENGTH ERROR":
RETURN
32667 SNAP$ = "FILE LOCKED": RETURN
32668 SNAP$ = "INVALID COMMAND": RETURN
32669 SNAP$ = "DIRECTORY FULL": RETURN
32670 SNAP$ = "FILE NOT FOUND": RETURN
32671 SNAP$ = "POINT INVALID": RETURN

```



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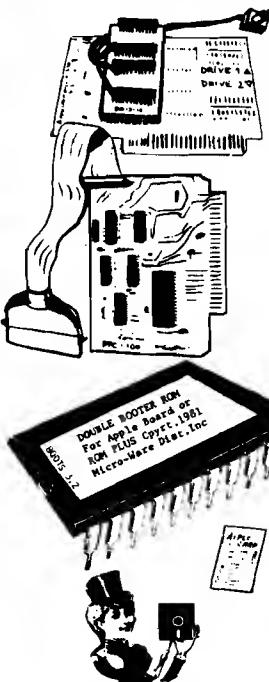
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Introduction to OS-65D V3.3

OS-65 V3.2 was an ultra sophisticated development-oriented operating system. However, several problems kept arising:

1. Output was difficult to format in BASIC.
2. There was no way to trap disk errors in BASIC.
3. Disk file operations were both slow and limited.
4. The nature of the OSI polled keyboard made the use of lower case alphabets tedious.

OS-65D V3.3 has been designed to eliminate these problems in earlier releases of 65D. In addition, the 65D BASIC line editor has been added as a permanent feature of BASIC. The following describes all the changes that have been made in V3.3. Enjoy!

Compatibility

OS-65D V3.3 has the BASIC workspace moved to \$3A7E as opposed to \$327E on OS-65D V3.2. This change makes no difference whatsoever to the average BASIC programmer. In fact, enhancements to 65D V3.3 allow existing V3.2 files to be both upward and downward compatible to the new system. However, care must be taken when using V3.2 files that contain assembler language subroutines. The subroutines will be transferred, along with the program that contains them, but will be physically relocated in memory and will probably not execute properly, if at all.

Programmable Error Action

In OS-65D V3.3 BASIC, the WAIT command has been replaced by the TRAP function which is used as an "ON ERROR GOTO" (but is easier to type). The TRAP function can be used either in the immediate mode or inside BASIC program and is effective whether a BASIC ERROR or DOS ERROR occurred. For example, consider the following program segment:

```

10 TRAP 1000
20 DISK OPEN,6,"DATA"
30 TRAP 40
40 INPUT#6,A:B=A/A
50 PRINT A:END
1000 ?"DISK ERROR":END

```

If a DISK ERROR occurred in line 20, control would be transferred to line 1000. Lines 30 and 40 are used to read the first non-zero number in the file. The TRAP function is disabled by the statement "TRAP0".

Keyboard Driver

The standard OSI polled keyboard driver has been replaced in OS-65D V3.3 by an all new keyboard decoder. The SHIFT LOCK key now acts as a CAP LOCK key and the RUBOUT key actually does delete characters. However, three characters still cause problems. These are listed below along with their keystroke equivalents:

^ - SHIFT N
[- SHIFT K
] - SHIFT M

Note: The SHIFT LOCK key must be depressed when these three characters are typed.

Random Files

OS-65D V3.3 incorporates several improvements in the random file capabilities in OS-65D. First, the DISK GET command has been altered to check which track is currently resident in RAM before actually reading a track. If the GET command determines that this is the track that is needed, no reread is performed. Thus, the random file access time is up to 48 times faster than in 65D V3.2.

Secondly, a DISK FIND command has been added. The syntax is "DISK FIND,string" where string is any BASIC string variable or quoted literal. The search begins at the current file pointer and will continue through the file. If the string is not found, an ERR#D will be reported (unless the TRAP command is used). If the string is found, the file pointer will be set to the beginning of the next field entry. For example:

```

10 DISK OPEN,6,"DATA"
20 DISK GET,10
30 PRINT#6,"HELLO":PRINT#6,"THERE!"
40 DISK GET,0
50 DISK FIND, "HELLO"
60 INPUT#6,A$
70 PRINT A$

```

This program will print out "HELLO!".

Note: The search rate for the FIND command is about 8K/second on 8" systems and 5K/second on mini-floppies.

Printer Drivers

The printer drivers in OS-65D V3.3 (devices 1 and 4) have a programmable paging feature which is enabled by the following:

```
PRINT#LP,CHR$(27); "C";CHR$(FL)
```

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where LP is the printer device number and FL is the form length you want. Ten percent of the form length is always reserved for the top and bottom margins. For example,

```
PRINT#1,CHR$(27);“C”;CHR$(66)
```

indicates form length of 66 where 60 lines are printed per page and six lines are reserved for the top and bottom margins. Immediately after the form length is set, a top of form is executed. At this time, position the paper in the printer as desired. To print a top of form to the next page, enter

```
PRINT#LP,CHR$(12);
```

The printer drivers also have a screen dump utility which may be used if you have an EPSON MX-80 printer and a standard OSI 540 video system. To use this feature, enter

```
PRINT#LP,CHR$(27);“P”;
```

OS-65D V3.3 Editor

In OS-65D BASIC, the keyword NULL is replaced by the word EDIT. After the system is booted, immediately type a non-destructive forward and backspace to tell the editor what type of keyboard you are using, (CTRL-L and CTRL-P are the forward space and backspace, respectively, for the OSI keyboards.) The syntax for editing a line is given in table 1.

Table 1

$0 = < LN < 64000$

| | |
|------------------------------|--|
| EDIT LN < CR > or !LN < CR > | Edit the statement with the line number LN. |
| EDIT! < CR > or !! < CR > | Edit the same line that was just edited. |
| EDIT < CR > or ! < CR > | Edit the line immediately following the line that was just edited. |

The line with its line number will be displayed following the <CR>. If the line number LN does not exist, the statement with the next line number will be displayed. (Typing EDIT0 or !0 will always give the first line of the program.) After the statement is displayed, the cursor will reside at the end of that line. The commands listed in table 2 are used for the actual line editing.

Table 2

| | |
|------------------------------|--|
| → /CTRL-L/Forward Space | Non-destructive forward space. Moves the cursor one space to the right. |
| ← /CTRL-H/CTRL-P/Backspace | Non-destructive backspace. Moves the cursor one space to the left. |
| RUBOUT/DELETE/SHIFT-0 | Single character delete. The editor makes the correct delete keys operational as well as the old ones (i.e., the RUBOUT key as well as SHIFT-0 will work on the OSI polled keyboard when the editor is enabled). |
| @/SHIFT-P | Entry delete. This will erase the line currently being edited, leaving the line in the text as it was before it was edited. |
| CTRL-R | Non-destructively moves the cursor to the rear of the statement. |
| CTRL-F | Non-destructively moves the cursor to the front of the statement. |
| CTRL-I | Non-destructively moves the cursor eight spaces forward (to the right). |
| CTRL-T | Retypes the statement you are currently editing. |
| < CR >/< RETURN > /< ENTER > | Enters the line as written or viewed. The line will look (to the BASIC interpreter) as if it were typed in by the user from scratch. |

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Character insertion and deletions can be accomplished anywhere by using the commands for non-destructive movement of the cursor. After the cursor is positioned, the user can type in insertions or delete unwanted characters. Note: Characters are inserted to the left of the character on which the cursor resided. The character on which the cursor resides is deleted until the end of the line is reached, and the characters to the left will be deleted if the cursor resides at the end of a line.

Video Driver

The video driver for 65D has been rewritten in order to provide (X,Y) cursor addressing and more than a dozen screen editing commands. These commands are used by printing CHR\$(27), an ASCII ESC, followed by the desired command. For example,

PRINT CHR\$(27);CHR\$(28);

clears the video screen and homes the cursor. The rest of the commands are given in table 3.

Table 3

| Code | Effect | | |
|---------------------------------|---|--------------------|---|
| CHR\$(1) | Causes following data to be printed in the color yellow. | CHR\$(18) | Moves cursor to the home position, i.e., (0,0) — the upper left-hand corner. |
| CHR\$(2);CHR\$(n); CHR\$(m) | All screen positions marked by color n are changed to color m. | CHR\$(19) | Deletes the line the cursor is on. Lines below the cursor scroll up one line. |
| CHR\$(5) | Sends the current cursor address through the keyboard driver, i.e., PRINT CHR\$(27); CHR\$(5)::INPUT A\$ then, A\$ = CHR\$(65 + X) CHR\$(65 + Y) | CHR\$(24) | Clears from the current cursor position to the end of the screen. |
| CHR\$(11) | Cursor moves down one line. | CHR\$(25) | Causes output to be printed in no color (black). |
| CHR\$(12) | Cursor moves up one line. | CHR\$(26) | Inserts a line at the cursor position. Lines below the cursor scroll down one line. |
| CHR\$(15) | Clears from the current cursor position to the end of line. | CHR\$(28) | Clears screen and homes cursor. |
| CHR\$(17);CHR\$(X); CHR\$(Y) | Moves cursor to screen position (X,Y). 0 ≤ X < 64 0 ≤ Y < 24 | CHR\$(29);CHR\$(n) | Clears all occurrences of color n on the screen. |
| | | CHR\$(31);CHR\$(n) | Causes the following data to be printed in the color n. |
| | | CHR\$(33) | Sends the character at the cursor position through the keyboard driver, e.g., Print CHR\$(27); CHR\$(33) INPUT A\$ |

Indirect File Problems? Why Not Use a Diskette?

In this section we describe a method for merging two BASIC files under the OS-65D operating system. The procedure uses the disk I/O capabilities of 65D to make your diskette into an indirect file. The following step-by-step procedure can be used to merge two programs. We start with both programs, say PROG1 and PROG2, stored on a diskette.

```
PROG1 N1 = 1 TRACK
40 REM THIS IS PROG1
50 REM
60 REM
70 END
```

```
PROG2 N2 = 1 TRACK
10 REM THIS IS PROG1
20 REM
30 REM
40 END
```

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1. Load PROG 1 into the workspace

DISK!"LOAD PROG1"

Enter

EXIT

The number of tracks necessary to hold PROG1 will be displayed, say N1 tracks. Return to BASIC by entering

RE BA

Now do the same with PROG2, obtaining its size, N2 tracks.

2. Run the disk utility CREATE and create a file PROG3, N1 + N2 (N3) tracks long, to hold the merged programs. If PROG2 already has enough space, the merged program can be stored as PROG2.

3. The number, N1, of tracks necessary to store PROG1 was determined in step 1. Run CREATE again and make a file called "DATA" with three times N1 tracks for a five inch diskette, and four times N1 tracks for an eight inch diskette. Answer NO to the query about pages per track. Specify four pages per track.

4. Load PROG1 into the workspace

DISK!"LOAD PROG1"

5. Enter the following POKEs to create a four-page buffer and to disable the scrolling of the screen (the screen will hold the buffer).

```
POKE 8998,0
POKE 8999,208
POKE 9000,0
POKE 9001,212
POKE 9770,0
```

6. Enter on a *single line*

DISK OPEN,6,"DATA":DISK!"IO ,22":LIST

A listing of the workspace will appear on the screen while PROG1 is being stored in the file DATA.

7. When the listing is finished, reset the I/O pointers and close the file by entering

DISK!"IO 02,02":DISK CLOSE,6

8. Load PROG2 into the workspace by entering

DISK!"LOAD PROG2"

9. Reopen the file DATA and merge PROG1 into PROG2 by entering

DISK OPEN,6,"DATA":DISK!"IO 20"

10. Reset the I/O pointers, close the file, and enable scrolling by entering

DISK!IO 02,02":DISK CLOSE,6
 POKE 9770,64

11. Store the merged file by entering

DISK!"PUT PROG3"

12. Clean house by rebooting the system.

If each of the programs has a line with the same number, the line in PROG1 will be the one that appears in the merged program.

*MERGED PROGRAM PROG3 N3 = 1 TRACK
N1 + N2*

```
10 REM THIS IS PROG2
20 REM
30 REM
40 REM THIS IS PROG1
50 REM
60 REM
70 END
```

Note: Line 40 of PROG2 was overwritten.

Finally, by changing the LIST specification in step 6, you can merge any part of a program, or just break up large programs. The uses are unlimited.

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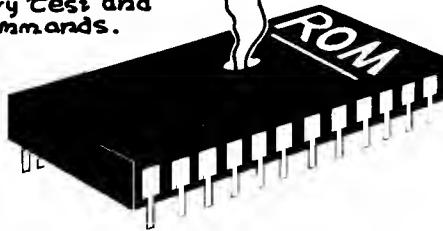
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By Paul Geffen

The Superboard

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Or you could buy the OSI C1P for \$429, which is a Model 600 with an extra 4K of program RAM in a case with a power supply. A good cassette recorder (not battery operated) is almost essential, and you would do well to arm yourself with additional reference materials which I will describe below.

Now you have a complete computer system which will allow you to write programs in BASIC and/or machine language. You can also run programs which others have written, as long as they were written for the OSI Superboard or C1P. Converting BASIC programs from other machines is sometimes easy, but sometimes almost impossible. For instance, tapes written for other micros probably won't load on the OSI.

Information Resources

As they become more experienced, most beginners notice that there is a lot that can be done with the Superboard that isn't explained or even hinted at in the OSI documentation. Many of the apparent limitations of the board are really only deficiencies in the User's Manual. Of course this is what user's

groups are for. There are a few good books available which offer much useful information, both for the beginner and the experienced programmer.

Perhaps the best to start with is Ed Carlson's *OSI BASIC in ROM*. This book, now in its second edition, is written by a C2P/C4P user, but almost everything in the book applies to the Superboard because the same BASIC comes with both machines. Carlson describes the capabilities of BASIC in considerably more detail than the User's Manual and he includes a few things the manual leaves out, like the bugs. Carlson goes into detail on solutions to the infamous Garbage Collector bug (which OSI doesn't even mention). Then he explains how to write good, well-organized BASIC programs and he provides many useful utility programs for clearing the screen (fast), converting hex to decimal, writing monitor format tapes, and so on.

The material on the actual mechanics of the BASIC interpreter is very useful and informative, and gives the key to many clever and efficient ways of writing programs for this machine. Finally, this book has a comprehensive list of publications and vendors of software for the OSI. In short, this is the book every Superboard owner should have alongside his User's Manual.

The next book I recommend for the more experienced user, is Williams and Dorner's *First Book of OSI*, published by Aardvark Technical Services. (Do not confuse this with a book with almost the same title, by Clothier and Adams, published by ELCOMP.) Williams and Dorner provide much of the same information as Carlson, with less introductory material, and more technically sophisticated material. Williams and Dorner's book is not for the beginner, as Carlson's is, so this should be the second book to buy.

The User's Manual does have some good points, namely a good job of printing and production. Of the books I have mentioned, it has the best graphics table and the best hex-to-decimal conversion table. Carlson has the most complete map of BASIC ROM entry points. Williams and Dorner go into more detail on what the ROM routines do.

The *First Book of Ohio Scientific* and *Second Book of Ohio Scientific* by Clothier and Adams contain mostly promotional material reprinted from OSI newsletters and entries from the

"Small Systems Journal." Most of the informative material here is also available, and better presented in Carlson's or Williams and Dorner's books.

Unfortunately, that about covers the available books written specifically for the OSI user. In addition to these books, two other sources of information exist: periodicals and plans for sale.

Two of the best periodicals were described last month, the *OSI Newsletter* and *PEEK(65)*. I also recommend the *Aardvark Journal*, which is now about six issues old. This is a bi-monthly journal, published by a leading supplier of software for OSI systems. For more information write to: Aardvark Journal, 1690 Bolton, Walled Lake, Michigan 48088.

There is one other OSI-only publication, the *Independent Newsletter*, O. S. I. U. I. N. put out by Charles Curley at 6061 Lime Ave., #2, Long Beach, California 90806. I have seen only one issue of this, and I don't feel it is enough to judge this relatively young newsletter.

MICRO publishes at least one OSI-related article each month as well as this column. *COMPUTE!* has an "OSI Gazette" and *Kilobaud Microcomputing* runs about four or five OSI-related articles per year.

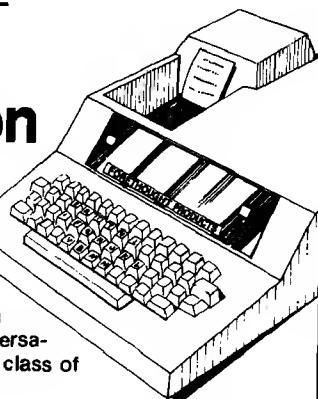
All of these publications supply short programs and hardware projects of real utility as well as good introductory material.

Finally, it is possible to buy plans and/or kits for various modifications to the Superboard. Ads for these run in MICR0 and other publications, and similar plans can be found in the above-mentioned publications. For instance, Video Mods, to increase the number of characters displayed per line, are described in *Aardvark #5* (simple), and *PEEK(65) #11* (complex).

I plan to publish a more complete list of OSI information resources in a future column. I am sure that I have overlooked some newsletters and magazines. I am particularly interested in boards or kits or plans that will expand the Superboard memory, expand the video display, increase the cassette speed, and provide RS 232 and modem support. Please send catalogs, etc. in care of this column, to ensure your product's inclusion in this list.

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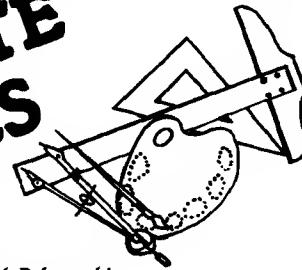
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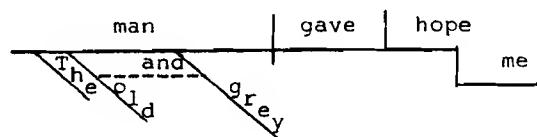
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BASIC Program Converter Between SYM and KIM

This program allows a person to transfer BASIC programs from SYM to KIM or from KIM to SYM without having to spend hours typing in and debugging the programs.

Lee Chapel
2349 Wiggins
Springfield, Illinois 62704

Have you ever wanted to put somebody's SYM BASIC program on your KIM without spending hours typing the program in and debugging it? Or have you ever wanted to put somebody's KIM program on your SYM? This converter program allows you to easily transfer BASIC programs from SYM to KIM, or from KIM to SYM. It is especially useful for long, 8 to 12K, programs. I used it to transfer a 14K program I call "Monster Combat" from KIM to SYM in roughly half an hour.

Description of BASIC Format

The BASIC format used in the SYM and KIM is as follows. The first two bytes of a program line point to the start of the next line (see diagram). The next two bytes are the line number, and the remaining bytes are BASIC tokens or data in ASCII. A token is one byte [80 to C5 hex] which represents a 2 to 6 letter BASIC word.

Tokens or Data in ASCII Code (Hex)

| | |
|----------------|-------------|
| LO HI | LO HI |
| Byte | Byte |
| Next line | Line number |
| pointer in hex | in hex |

The tokens in both SYM and KIM (such as INPUT and PRINT) are the same hex value. For example, on both systems INPUT is 84 in hex, and PRINT is 97 in hex. An example of how a BASIC line is formed is shown in figure 1.

4000 00 14 40 05 00 97 22 48 49 20 54 48 45 52 45 22 3A 88 35
Pointer Line PR " H I T H E R E " : GO TO 5
to next num INT
line ber

Comparison of SYM and KIM Systems

KIM begins program storage at 4000 hex, SYM begins storage at 0200 hex. Since the data and the tokens are the same, only the line pointers and actual program location in memory need to be changed. The program can be relocated on SYM by use of the Block Move, "B". On KIM the use of a supplementary monitor such as "XIM" can be used to relocate the program. It's also possible to relocate the program by using the tape load FF function and new address. The regular KIM tape record and playback are the same as the low speed SYM tape record and playback.

The only remaining difference between the two systems is the pointer values. They all need to be changed to reflect the new location in the other system. The BASIC converter program is written to convert all these pointer locations. The BASIC program takes only a few seconds to convert long programs, so speed is not a problem.

Converter Program Description

In both program listings, A is the address where the low byte of the first pointer is located. B is the value found in the address A, and C is the value of the high byte of the pointer. D is set

equal to the first hex digit of C, and E is set equal to the other hex digit of C. D, E, and B are then placed in an equation where F becomes the value of the address of the next line pointer. Since only the high byte needs to be changed, the address A + 1 is POKEd with a new value. A is then set equal to F and the entire process continues with a new value of the line pointer until two zeros are found in adjacent addresses.

Program Examples

The following is an example of a KIM to SYM conversion. First check addresses 7D and 7E. These are, respectively, the low and the high bytes of the end of the program being transferred. Make a record of these values and make a recording from 4000 hex to the address in those two memory locations at normal record speed. Next the tape is loaded into SYM at slow speed and placed in memory so that it starts at 4000. SYM BASIC is then entered with a J 0 and when Memory Size is asked for, a low value, such as 1500, should be entered. Type in the converter program. Make sure there are no errors and then run the program. Once the program finishes, go back into the monitor, move the program at 4000 hex down to 0200 hex. Take the value in 7D that you noted and subtract 3E hex

from it, and place that number in 7D. Next take the value noted for 7E and place it in 7E. Then set memory locations 87 and 88 to the proper size of your BASIC program area.

Converting from SYM to KIM is similar. Again, check memories 7D and 7E and make a note of them. Make a tape of the program in the SYM's low speed format. Load it into KIM and place it in memory so that it starts at 5000 hex. Then start KIM BASIC and when you are asked for Memory Size, give a low value such as 17000. Type in the conversion program, make sure there are no errors, and run it. When the program finishes, go back to the monitor and move the converted program from 5000 to 4000. Take the value noted for 7D and add 3E hex to it. Take the value noted for 7E, and place it in 7E. Change memory locations 87 and 88 to the proper size of your BASIC program memory. After moving and testing, a final tape dump can be made.

Conclusion

I have used both these conversion programs successfully on several BASIC programs. Any USRs or special

I/Os will have to be modified. It should also work on AIM, assuming the tokens are the same. These programs have saved many hours of retyping programs between systems.

Lee Chapel has been working with KIM and SYM for about 3 years. He is majoring in Computer Science at the University of Wisconsin-Madison and has worked there as a programmer in the Agriculture Economics department.

MICRO

Listing 1

```

5 REM SYM TO KIM CONVERSION IN BASIC
10 A=20481
15 IF PEEK(A)=0 AND PEEK(A+1)=0 THEN END
20 B=PEEK(A):C=PEEK(A+1)
25 D=INT(D/16):E=C-16*D
30 F=4096*D+256*E+B+19968
35 POKEA+1,C+62
40 A=F:GOTO 015
45 END

```

Listing 2

```

5 REM KIM TO SYM CONVERSION IN BASIC
10 A=16385
15 IF PEEK(A)=0 AND PEEK(A+1)=0 THEN END
20 B=PEEK(A):C=PEEK(A+1)
25 D=INT(C/16):E=C-D*16
30 F=4096*D+256*E+B
35 POKEA+1,C-62
40 A=F:GOTO 015

```

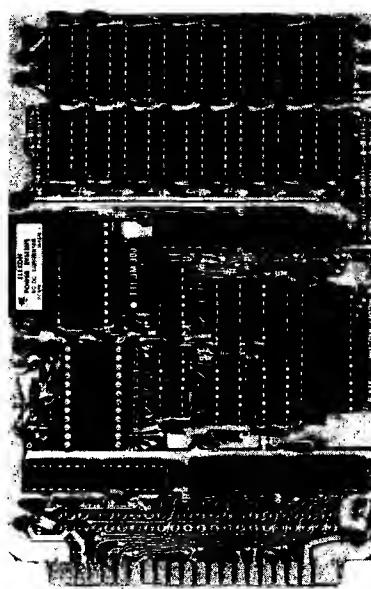
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Microbes and Updates

Mike Rowe
Microbes & Updates
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This month, we offer the following improvements, rather than corrections.

Les Cain, of Grand Junction, Colorado, sent this update to his article in the January issue (32:75): There is a problem with Control C in "Fun with OSI." I apologize to the readers for the oversight in not replacing the Disk control C POKE with the proper ROM POKE. To correct the problem, change the following lines:

Line 760 POKE 530,1:K=57088
Line 1710 POKE 530,0:END
Line 1740 POKE 530,0:END

Charles F. Taylor, Jr. of Monterey, California, offers the following tip: "Business Dollars and Sense in Applesoft" by Barton M. Bauers, Jr. (MICRO 27:65) was most interesting and useful. Here are a couple of simple changes which will make the routine "Mask" even more useful:

1. "Mask" produces output left-justified in a variable-width field. While this is useful for some applications, it will not do for producing columns of figures. Ideally, the output should be right-justified in a predetermined field width (specified by the user). This can be accomplished by adding lines 16 and 15025 and by modifying line 15110 as shown below:

16 FW = 12 : REM SET FIELD
WIDTH (5 = FW = 12)
15025 BL\$ = " " : REM 8 BLANKS
15110 XW\$ = X\$ + LEFT\$(BL\$,
FW - 4 - LEN(XX\$)) + XX\$ +
XZ\$

Line 16 as shown, produces the maximum allowable field width and is sufficient to handle dollar amounts from \$ - 999,999.99 to \$9,999,999.99, which is the range handled by Mr. Bauers' original routine, and which should be adequate for most small applications. (It is certainly adequate for my personal checkbook.) The field width can be changed anywhere in the calling program by assigning the desired value to the variable "FW". Line 15110 as shown left-justifies the leading "\$", but this is easily changed.

2. Because of the behavior of the function "INT" (described by Mr. Bauers in his article), the routine as it stands will round fractional cents incorrectly for negative amounts, e.g. -1.009 rounds to -1.00 instead of -1.01. (Fractional cents occur most often when computing percentages.) Here is a simple fix to line 15 which solves the problem:

15 DEF FN VL(X) = INT((X +
SGN(X)*.0001)*100 + .5)

John P. Molineaux of Cheverly, Maryland, sent this enhancement: There is always a better way. On reading Frank Chipchase's excellent article on "Better Utilization of Apple Computer Renumber and Merge Program" in the August 1980 issue (27:17), I was struck by the awkwardness of the series of EXEC file POKEs required to configure the A/S-R/N-M program. Machine language is far better than Applesoft at POKEs and it doesn't fill the screen with Applesoft prompt characters ([]).

Recall that HIMEM:32352 is equivalent to POKE 115,0:POKE 116,142. Hiding A/S-R/N-M and resetting the &-pointer therefore translates to:

| Assembly | Decimal |
|----------|-----------|
| LDA 0 | 169 0 |
| STA 115 | 133 115 |
| STA 1014 | 141 246,3 |
| LDA 142 | 169 142 |
| STA 116 | 133 116 |
| STA 1015 | 141 247,3 |
| LDA 76 | 169 76 |
| STA 1013 | 141 245,3 |
| RTS | 96 |

If this short program is appended to the front of the A/S-R/N-M and the whole mess is BSAVED as a unit under the name RENUM, then the loading and reconfiguration is quickly achieved by

BRUN RENUM

Here's how:

1. RUN Apple's RENUMBER from the system disk.
2. POKE in the 20 bytes of the program as follows:

POKE 36332,169
POKE 36333,0
POKE 36334,133
POKE 36335,115
POKE 36336,141
POKE 36337,246
POKE 36338,3
POKE 36339,169
POKE 36340,142
POKE 36341,133
POKE 36342,116
POKE 36343,141
POKE 36344,247
POKE 36345,3
POKE 36346,169
POKE 36347,76
POKE 36348,141
POKE 36349,245
POKE 36350,3
POKE 36351,96

Of course, the monitor is zippier on this kind of task, if you want to enter the hex equivalents of the decimal POKEs in \$8DEC through \$8DFF.

3. BSAVE RENUM,A36332,L2068

Notice that an additional 20 bytes spill over onto one more track in the RENUM data set.

This way of saving the program saves a second or two on each run and dispenses with the screenful of empty "[" lines that scoot your last display off the screen. After the BRUN RENUM, the 20-byte program is eventually destroyed the next time an Applesoft string is created.

DJ



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Author: **Jeffrey Durham**
Available: **Mike Rowe Productions**
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System: CBM Commodore
Memory: 32K
Language: BASIC
Hardware: CBM 3032/
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Description: It is a whole package for handling the results of X-Ray-Examinations and liquid dye examinations of welds, 6 languages (German, Italian, French, English, Spanish and Portuguese), aic implemented.

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Available: **M. Bauer**
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Name: **0-1. Options**
System: PET
Memory: 8K
Language: BASIC
Hardware: PET/CBM

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Language: Applesoft II
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Memory: Min. 20K (ROM
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Language: Applesoft and Machine
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 Available: **ARIES SOFTWARE**
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 Memory: 32K
 Language: Applesoft in ROM
 Hardware: Disk, optional printer
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Author: **Larry Johnson**
 Available: **SouthWest EdPsych Services**
 P.O. Box 1870
 Phoenix, Arizona 85001

Name: **The Mailing Label and Filing System**
 System: Apple II
 Memory: 48K
 Language: Applesoft
 Hardware: Apple II, Disk II (one or two drives)

Description: Has loads of features: binary sorting; 1 - 3-second access of records by name or record number; user formatted; optional 9-digit zip code update; performs COUNT/SORTS which enables the user to display a certain type of population off the disk and/or make print-outs or mailing labels; reversible directory reading; special backup programs, insert programs, copy-by-record (for backup) programs; automatic formatting file and directory updating; edit; delete; write; count; read; print; customized mailing labels, quicksort utilization; much more.

Price: \$24.95 includes disk, manual, demo sheet.
 Author: **Avant-Garde Creations**
 Available: **Avant-Garde Creations**
 P.O. Box 30161 MCC
 Eugene, Oregon 97403

Name: **Z-Term**
 System: Apple II or Apple II Plus
 Memory: 48K
 Language: CP/M,
 [Machine Language]
 Hardware: Disk II (DOS 3.2 or 3.3), Z-80 Softcard, Micro-modem II or most other communications devices, 80-column board or external terminal optional.

Description: Upload and download data files between the Apple and another computer. A number of "luxury" features are also provided. Commonly used systems can be put into a directory for auto-dialing, keyboard Macros allow you to define strings for output with simple keystrokes for fast log-ins to system, or to issue various commands within the system. Table-driven prefix keys allow you to produce any character not already on the Apple keyboard without losing any other keys! Fully compatible with standard CP/M sequential text files, and can send files from disk of any size, and can receive up to 36K of data at a time. Auto-save mode will send XOFF character to host, save file (with operator prompting) and then continue.

Price: \$79.95, introductory (until May 1, 1981)
 Author: **Bill Blue**
 Available: **Southwestern Data Systems**
 P.O. Box 582-M
 Santee, California
 92071

Name: **Display-it**
 System: OSI, C1P or Superboard
 Memory: 4K
 Language: 8K BASIC-in-ROM
 Description: Displays messages from right to left in large letters made up of any graphics character. Messages can be up to 255 characters long.
 Price: \$5.95 ppd.
 includes cassette and documentation
 Author: **Brian and Craig Zupke**
 Available: **BC Software**
 9425 Victoria Drive
 Upper Marlboro
 Maryland 20870

Name: **Small Business Accounting (SBA)**
 System: OSI C4P MF
 Language: BASIC under OS65D
 Hardware: Printer, 2 Disks (second optional)

Description: Provides double-entry journal system for cash flow analysis and reports. Automatic checking of distribution account totals at time of entry. User-defined fields in data base files; up to 99 expense and income accounts, 999 vendor/customer accounts, with names up to 72 characters. Six digit (XXXX.xx) capability in base module is expandable. Prints Income Statement, Trial Balance, Charts of Accounts and Vendor/Customer lists. Summary financial information totalable by month, quarter, and YTD. Sorting is available on user specified fields. All records are MDMS compatible and code allows user system configuration.

Price: \$100.00 (3rd Class mail free, 1st Class add \$2.00).
 Includes: (1) program disk and (1) data disk with sample file. User manual and Accounting System Guide and sample source documents provided. Program listings only are available for \$20.00 each.
 Author: **J.O. Rector**
 Available: **Video Ventures**
 1708 Beechwood Avenue
 Fullerton, CA 92635

Name: **GRAFPAK APPLE**
 System: Apple II
 Memory: 32K minimum
 Language: Either BASIC and 6502 ML

Hardware: Disk and graphic printer
 Description: GRAFPAK is a family of programs for reproducing the Hi-Res pages using grab-the-wire printer graphics. 1x and 2x scaling are standard, and 3x and 5x are available with some printers. Normal and inverse inking is selectable, and variable indent is provided. Features vary with make and model of printer. Packages available for IDS-440, 445 and 460, Anadex DP-9XXX family, and Epson MX-70 and MX-80 with graphic PROMs.

Price: \$24.95 (+1.65 in Ohio) includes diskette and user's guide (specify DOS release and printer model).
 Available: **SmartWare**
 2281 Cobble Stone Court
 Dayton, Ohio 45431

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This data management program provides accurate record keeping and report generation for bowling leagues of up to 40 teams with 6 bowlers per team. Needs 80-column printer, 32K Applesoft ROM.
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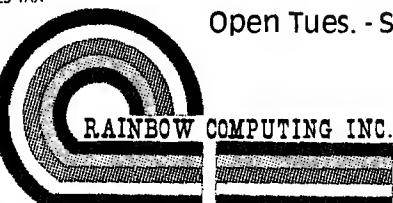
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Apple Fun

We've taken five of our most popular programs and combined them into one tremendous package full of fun and excitement. This disk-based package now offers you these great games:

Mimic—How good is your memory? Here's a chance to find out! Your Apple will display a sequence of figures on a 3x3 grid. You must respond with the exact same sequence, within the time limit.

There are five different, increasingly difficult versions of the game, including one that will keep going indefinitely. Mimic is exciting, fast paced and challenging—fun for all!

Air Flight Simulation—Your mission: Take off and land your aircraft without crashing. You're flying blind—on instruments only.

A full tank of fuel gives you a maximum range of about 50 miles. The computer will constantly display updates of your air speed, compass heading and altitude. Your most important instrument is the Angle of Ascent/Bank Indicator. It tells if the plane is climbing or descending, whether banking into a right or left turn.

After you've acquired a few hours of flying time, you can try flying a course against a map or doing aerobatic maneuvers. Get a little more flight time under your belt, the sky's the limit.

ColorMaster—Test your powers of deduction as you try to guess the secret color code in this Mastermind-type game. There are two levels of difficulty, and three options of play to vary your games. Not only can you guess the computer's color code, but it will guess yours! It can also serve as referee in a game between two human opponents. Can you make and break the color code...?

Star Ship Attack—Your mission is to protect our orbiting food station satellites from destruction by an enemy star ship. You must capture, destroy or drive off the attacking ship. If you fail, our planet is doomed...

Trilogy—This contest has its origins in the simple game of tic-tac-toe. The object of the game is to place three of your colors, in a row, into the delta-like, multi-level display. The rows may be horizontal, vertical, diagonal and wrapped around, through the "third dimension". Your Apple will be trying to do the same. You can even have your Apple play against itself!

Minimum system requirements are an Apple II or Apple II Plus computer with 32K of memory and one minidisk drive. Mimic requires Applesoft in ROM, all others run in RAM or ROM Applesoft.

Order No. 0161AD \$19.95

Paddle Fun

This new Apple disk package requires a steady eye and a quick hand at the game paddles! It includes:
Invaders—You must destroy an invading fleet of 55 flying saucers while dodging the carpet of bombs they drop. Your bomb shelters will help you—for a while. Our version of a well known arcade game! Requires Applesoft in ROM.

Howitzer—This is a one or two person game in which you must fire upon another howitzer position. This program is written in HIGH-RESOLUTION graphics using different terrain and wind conditions each round to make this a demanding game. The difficulty level can be altered to suit the ability of the players. Requires Applesoft in ROM.

Space Wars—This program has three parts: (1) Two flying saucers meet in laser combat—for two players, (2) two saucers compete to see which can shoot out the most stars—for two players, and (3) one saucer shoots the stars in order to get a higher rank—for one player only. Requires Applesoft.

Golf—Whether you win or lose, you're bound to have fun on our 18 hole Apple golf course. Choose your club and your direction and hope to avoid the sandtraps. Losing too many strokes in the water hazards? You can always increase your handicap. Get off the tee and onto the green with AppleGolf. Requires Applesoft.

The minimum system requirement for this package is an Apple II or Apple II Plus computer with 32K of memory and one minidisk drive.

Order No. 0163AD \$19.95

Solar Energy For The Home

With the price of fossil fuels rising astronomically, solar space-heating systems are starting to become very attractive. But is solar heat cost-effective for you? This program can answer that question.

Just input this data for your home: location, size, interior details and amount of window space. It will then calculate your current heat loss and the amount of gain from any south facing windows. Then, enter the data for the contemplated solar heating installation. The program will compute the NET heating gain, the cost of conventional fuels vs. solar heat, and the calculated payback period—showing if the investment will save you money.

Solar Energy for the Home: It's a natural for architects, designers, contractors, homeowners... anyone who wants to tap the limitless energy of our sun.

Minimum system requirements are an Apple II or Apple II Plus with one disk drive and 28K of RAM. Includes AppleDOS 3.2.

Order No. 0235AD (disk-based version) \$34.95

Math Fun

The Math Fun package uses the techniques of immediate feedback and positive reinforcement so that students can improve their math skills while playing these games:

Hanging—A little man is walking up the steps to the hangman's noose. But YOU can save him by answering the decimal math problems posed by the computer. Correct answers will move the man down the steps and cheat the hangman.

Spellbinder—You are a magician battling a computerized wizard. In order to cast death clouds, fireballs and other magic spells on him, you must correctly answer problems involving fractions.

Whole Space—Pilot your space craft to attack the enemy planet. Each time you give a correct answer to the whole number problems, you can move your ship or fire. But for every wrong answer, the enemy gets a chance to fire at you.

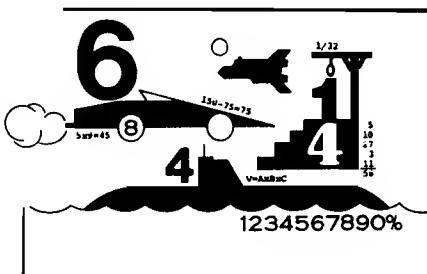
Car Jump—Make your stunt car jump the ramps. Each correct answer will increase the number of buses your car must jump over. These problems involve calculating the areas of different geometric figures.

Robot Duel—Fire your laser at the computer's robot. If you give the correct answer to problems on calculating volumes, your robot can shoot at his opponent. If you give the wrong answer, your shield power will be depleted and the computer's robot can shoot at yours.

Sub Attack—Practice using percentages as you maneuver your sub into the harbor. A correct answer lets you move your sub and fire at the enemy fleet.

All of these programs run in Applesoft BASIC, except Whole Space, which requires Integer BASIC.

Order No. 0160AD \$19.95



Skybombers

Two nations, separated by The Big Green Mountain, are in mortal combat! Because of the terrain, their's is an aerial war—a war of SKYBOMBERS!

In this two-player game, you and your opponent command opposing fleets of fighter-bombers armed with bombs and missiles. Your orders? Fly over the mountain and bomb the enemy blockhouse into dust!

Flying a bombing mission over that innocent-looking mountain is no milk run. The opposition's aircraft can fire missiles at you or you may even be destroyed by the bombs as they drop. Desperate pilots may even ram your plane or plunge into your blockhouse, suicidally.

Flight personnel are sometimes forced to parachute from badly damaged aircraft. As they float helplessly to earth, they become targets for enemy missiles.

The greater the damage you deal to your enemy, the higher your score, which is constantly updated at the bottom of the display screen.

The sounds of battle, from exploding bombs to the pathetic screams from wounded parachutists, remind each micro-commander of his bounden duty. Press On, SKYBOMBERS—Press On!

Minimum system requirements: An Apple II or Apple II Plus, with 32K RAM, one disk drive and game paddles.

Order No. 0271AD (disk-based version) \$19.95



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Santa Paravia and Fiumaccio

Buon giorno, signore!

Welcome to the province of Santa Paravia. As your steward, I hope you will enjoy your reign here. I feel sure that you will find it, shall we say, profitable.

Perhaps I should acquaint you with our little domain. It is not a wealthy area, signore, but riches and glory are possible for one who is aware of political realities. These realities include your serfs. They constantly request more food from your grain reserves, grain that could be sold instead for gold florins. And should your justice become a trifle harsh, they will flee to other lands.

Yet another concern is the weather. If it is good, so is the harvest. But the rats may eat much of our surplus and we have had years of drought when famine threatened our population.

Certainly, the administration of a growing city-state will require tax revenues. And where better to gather such funds than the local marketplaces and mills? You may find it necessary to increase custom duties or tax the incomes of the merchants and nobles. Whatever you do, there will be far-reaching consequences...and, perhaps, an elevation of your noble title.

Your standing will surely be enhanced by building a new palace or a magnificent *cattedrale*. You will do well to increase your landholdings, if you also equip a few units of soldiers. There is, alas, no small need for soldiery here, for the unscrupulous Baron Peppone may invade you at any time.

To measure your progress, the official cartographer will draw you a *mappa*. From



it, you can see how much land you hold, how much of it is under the plow and how adequate your defenses are. We are unique in that here, the map IS the territory.

I trust that I have been of help, signore. I look forward to the day when I may address you as His Royal Highness, King of Santa Paravia. *Buona fortuna* or, as you say, "Good luck". For the Apple 48K.

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A LITTLE HISTORY

Many years ago, when the Apple II first came out, it was possible to program a 48K computer. At this time you were somewhat constrained to Integer BASIC and a cassette storage medium.

Shortly thereafter, APPLESOFTTM appeared. The original (RAM) version improved upon the Apple's capabilities but reduced the programmer memory by about 12K. You could now do more but had less memory to do it with.

The situation soon changed again when Apple introduced the APPLESOFT ROM card. For \$195 the programmer now had both Integer and APPLESOFT capabilities and 48K available.

In keeping with tradition, Apple followed the ROM card with an even more classier act: the Disk drive. A majority of Apple owners now have a 48K Apple computer with Integer BASIC, APPLESOFT, and a Disk Operating System (DOS). But the 48K in the computer is no longer fully available to the programmer since DOS occupies 10.5K of memory (actually 10752 bytes). A 48K Apple actually has 37.5K of programmable memory if DOS is booted.

THE MEAT OF THIS AD

MEMORY MANAGEMENT SYSTEM (MMS)TM by C.D.S. is a unique, exciting new way to get back the 10.5K of memory allotted to DOS. Here's how it operates:

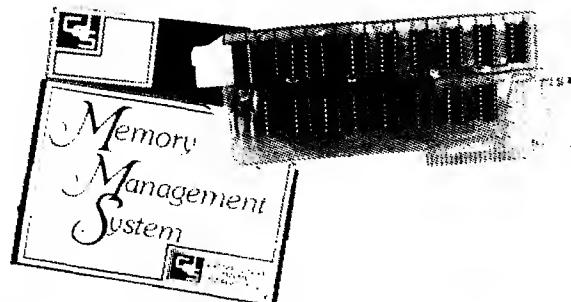
(1) A 48K Apple is configured with a 16K RAM EXPANSION BOARD in slot 0, and an APPLESOFT card or another 16K RAM EXPANSION BOARD in slot 4.

(2) DOS is booted as you normally would, using a DOS 3.3 System Master diskette, or DOS 3.2 BASICS diskette followed by a DOS 3.2 System Master.

(3) BRUN the MMS program.

In a few seconds your Apple computer will recognize both Integer BASIC and APPLESOFT AND the DOS will be relocated on the 16K RAM EXPANSION BOARD!

With DOS now resident on the 16K RAM board, 10.5K of memory is released for your programming use.



16K EXPANSION BOARDS

Currently there are three 16K RAM boards available for the Apple computer.

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| MICROSOFT RAMCard TM | (retail \$195.00) |
| ANDROMEDA BOARD TM | (retail \$195.00) |

ALL of these boards will work with MMS. However, since we market the ANDROMEDA 16K RAM EXPANSION BOARD, we are able to make the following offer:

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| MMS diskette | \$ 39.95 |
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| ANDROMEDA 16K RAM BOARD plus MMS diskette | \$215.00 |
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A FEW PROGRAMMER NOTES

DOS is somewhat altered with MMS. The command INIT is disabled, so you should INIT all your diskettes prior to starting up with MMS. In addition, MAXFILES automatically defaults to 2 but can be changed if desired.

The MMS program uses page 3 (\$300.-\$3FF) for interfacing and it is not available for programmer use.

Regardless of your Apple's configuration, approximately 2K of memory is devoted to the internal operating system (monitor).

Special configurations of MMS are available upon request.

HOW TO ORDER

MMS and the ANDROMEDA 16K RAM EXPANSION BOARD are available through your local computer store.

Or you can order direct by calling COMPUTER DATA SERVICES at (516) 360-0988. VISA, Master Card, and COD accepted. Credit card and check orders are shipped postage - paid. Shipping charges are:

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890. The Cider Press (October, 1980)

Weiglin, Peter C., "Formatting," pg. 5-6.

Formatting and printing backwards on the Apple.

Bernheim, Phil, "Initialize New Files Automatically," pg. 6.

A handy tip for handling files kept on a periodic basis. For the Apple.

Bernheim, Phil, "Another Way to Find Hidden Characters," pg. 6.

A fix for hidden characters in Apple programs.

Bernheim, Phil, "Dates," pg. 8.

An easy way to encode and decode dates.

Hertzfeld, Andy, "Delete the Flashing Cursor," pg. 8.

A short monitor routine to silence the flashing cursor.

Bernheim, Phil, "Converting String Dates," pg. 11.

Routine to convert string dates to datum of the form MMDDYY.

Wilson, Gene, "Je M'Apple' PASCAL."

Several Pascal programs for the Apple.

891. The Apple Barrel 3, No. 7 (September/October, 1980)

Anon., "File Cabinet Partially Exposed," pg. 5-6.

A tutorial on the use of this important Apple utility.

Winter, Kevin, "Using the Backspace as a Delete Key," pg. 7.

A technique to add special functions to the Apple.

McGee, Pat, "Pascal Problems," pg. 9-13.

A number of problems with Apple Pascal and the fixes.

Barber, Bruce, "Screen Create," pg. 13-19.

A poor man's graphic tablet for the Apple.

Meador, Lee, "Disassembly of DOS 3.2," pg. 19-31.

The fifth installment of this excellent series, on the Apple DOS 3.2.

892. Stems from Apple 3, Issue 10 (October, 1980)

Sittel, Randy, "Are You Overtaxing Your Computer?", pg. 3.

A table of the current requirements of various Apple peripherals.

Ward, Dennis, "Display and Dec/Hex Converter," pg. 5.

Two short programs for the Apple.

Anon., "Kent's Puzzle Entries," pg. 8-11.

A series of 18 short programs for the Apple.

Todd, Allen W., "Blockedit," pg. 13-20.

An Apple Pascal disk utility, allowing examination and editing of any diskette block.

893. The Apple-Dillo (October, 1980)

Sethre, Tom, "Roots," pg. 3.

Another installment of this tutorial on Apple machine language, dealing with handling keyboard input.

Teas, George, "Pascal Primer," pg. 5.

A new column to help novice Pascal users with helpful programming hints.

Huffman, David, "Personalizing Your Catalog Heading," pg. 5.

An Apple DOS 3.2.1 tutorial.

Bartley, David, "Getting There Faster in Applesoft BASIC," pg. 6-7.

Speed up your Applesoft programs.

Sethre, Tom, "The Official Computer Game Player Cheater's Guide," pg. 7-8.

Sethre, Tom, "Memory Display," pg. 9.

A machine language routine for the Apple.

894. The G.R.A.P.E. Vine (September, 1980)

Sander-Cederlof, "One-Liner," pg. 1.

A one-liner for the Apple.

Anon., "Hi-Res Plotting of Characters from Character Table," pg. 2.

A Hi-Res writing program.

Anon., "Faster Shell," pg. 8.

This Faster Shell Sort is approximately 25% faster than the Hibbard Sort appearing in the last issue.

895. The Seed 2, No. 10 (October, 1980)

Anon., "Apple Pi Conventions," pg. 7.

A listing to standardize title pages on donated programs—for the Apple.

896. Applications 3, No. 2 (August, 1980)

Camiller, Derek, "GET vs. INPUT," pg. 12.

Simplify your input statements and responses.

Webster, Ian, "Telecom, Modems and Other Mysteries," pg. 14-17.

All about Modem use with the Apple in Australia.

Webster, Ian, "Relocation of Apple Machine Code," pg. 20-25.

This program will relocate machine code programs.

Haines, Ron, "Some Notes on the UCSD Assembler," pg. 26-27.

Additional comments to augment skimpy documentation of the Apple Pascal system.

Fields, Randy and Thompson, C., "Shorten Disk Commands," pg. 28.

Significantly shorten the Apple Disk Operating commands.

897. Radio Electronics 51, No. 10 (October, 1980)

Staff, "Buyer's Guide to Home Computers," pg. 45-84.

Among others, covers Apple, PET, OSI and Atari micros, including peripherals and accessories.

898. Fort Worth Apple User Group Newsletter (FWAUG) 2, No. 2 (October, 1980)

McVay, Ray, "Ampersoft," pg. 2-4.

Three routines for machine language string manipulation to forestall garbage collection and quicken sorting.

Meador, Lee, "DOS 3.2 Disassembly—9," pg. 6-21.
This installment of this important series discusses the Output State Machine and the data area and tables of commands and error messages.

Matzinger, Bob, "Make a Hello a Binary File," pg. 23.
A tricky way to put the boot program in Binary, for the Apple.

899. Personal Computing 4, No. 10 (October, 1980)

- Fischer, Mike, "Word Search," pg. 34-39.
An Apple program to solve those jumbled letter matrices with hidden words.
- Lubar, David, "Problem Solving and Computers," pg. 49-50.
Use of the Apple in problem solving.
- Gaylor, Sam, "Cash In On the Power of Pascal," pg. 52-53.
Pascal program on the "melt value" of silver coins.
- Jones, Jeremy C., "A Computer Spelling Exercise," pg. 54-55.
An educational program for OSI computers.
- Welsh, Dave, "Rating BORIS 2.5," pg. 78-90.
All about the 6502-based computer programs called BORIS 2.5/Sargon 2.5.

900. MICRO No. 29 (October, 1980)

- Berger, Thomas R., "An OSI Cheep Print," pg. 7-12.
Hardware and Software to interface OSI systems with a printer.
- Morris, Gary A., "PRINT USING for Applesoft," pg. 14-17.
Program permitting user-defined formatting of the output of Applesoft.
- Kolbe, Werner, "Define Your Own Function Key on PET," pg. 19-20.
Program routine to call a commonly used BASIC function from the keyboard.
- DeJong, Marvin L., "An Improved Morse Code Receive Routine and Interface," pg. 23-26.
Hardware and Software for the AIM 65.
- Borton, David, "Undedicated A Dedicated Microcomputer," pg. 27-28.
Developing a time-shared process controller for the KIM-1.
- MacDonald, R., "A 'Stop-On-Address' Routine for KIM."
A routine to debug more efficiently through the use of a trap to stop on a specified address.
- Schultz, Robert, "Tiny Pilot Complemental (Co-Pilot)."
Modification to Tiny Pilot improving the 'Match' statement—for the SYM.
- Boynton, G.R., "For Multiple File Tape Backups," pg. 36-38.
This PET utility takes the drudgery out of making multiple backup copies of cassette files.
- Wright, Loren, "PET Vet," pg. 39.
Comments on PET documentation and literature references.
- Burcher, P.E., "Biorythm: An AIM BASIC Programming Exercise," pg. 51-55.
Programs providing an interesting demonstration for using the AIM and its printer.
- Moyer, LeRoy, "Hexadecimal Printer," pg. 57-58.
A simple Apple II program permitting the user to specify the limits within which he wants the disassembler to operate.

Mulligan, John P., "Programming with Pascal," pg. 59-63.

Tutorial and Sorting routine for Apple Pascal.

Ellis, Dawn E., "Cassette Label Program," pg. 65-67.

Let the computer do the dirty work printing labels for those tape cassettes. For the Apple.

Rowe, Mike (Staff), "The MICRO Software Catalog: XXV," pg. 73-75.

Sixteen new items of software for 6502 systems are reviewed.

Dial, Dr. William R., "6502 Bibliography: Part XXV," pg. 76-77.

Some 65 new references to the extensive 6502 literature.

901. PEEK(65) Vol. 10 (October, 1980)

Williams, Jim, "Cold Start/System Crash Recovery," pg. 4-5.

Recovering from system crashes caused by errant POKE statements on OSI micros.

Lewton, Maurice P., "C1P or Superboard II GET Routine," pg. 7.

A listing for OSI micros providing a 'GET' routine.

Criscione, J.R., Jr., M.D., "More on OS-65U Password File Protection," pg. 11.

Comments and listing for program security.

902. Ham Radio 13, No. 10 (October, 1980)

Skeen, W.S., "A CW Keyboard Using the Apple II Computer," pg. 60-62.

Program Listing and simple interface hardware for using the Apple II with your Amateur station.

903. The G.R.A.P.E. Vine (October, 1980)

Anon., "Automatic Free Space with Catalog," pg. 3.
Short modified routine for the booting of your disks.

Anon., "DOS Changes on Disks," pg. 4.
How to personify your disks.

Anon., "What is Theomatics?", pg. 5-7.
Discussion and two listings related to biblical literature.

904. Creative Computing 6, No. 10 (October, 1980)

McClure, Jim, "The C2-4P Ohio Scientific Computer," pg. 17-23.

A review of a new micro.

Lubar, David, "Sound Advice," pg. 26-29.
DAC's and Music boards for 6502 machines.

Ahl, David H., "Easy Writer," pg. 34.
A review of a word processor for the Apple.

Platt, Charles, "Bargain-Basement Word Processing," pg. 54-55.

Review of the WP6502 word processor useful for OSI micros, Apple, PET, Atari, etc.

Carpenter, Chuck, "Apple-Cart," pg. 162-167.

How to avoid 'extra ignored' messages, saving strings on tape, listing for AC control routine, etc.

Yob, Gregory, "Personal Electronic Transactions," pg. 168-172.

How to get lower case letters on a PET, program providing automatic repeat of keys, PET machine language tutorial and examples, etc.

Blank, George, "Outpost: Atari," pg. 174-177.

String array demonstration, precautions for input/output, printer interface, programmer's aid, etc.

905. Apple/Sass (October, 1980)

Burson, Dick, "Name that Tone!", pg. 9.
Tone generating routines for the Apple.
Anon., "Math Drill II," pg. 14.
An educational Apple program.
Golding, Val J., "Hidden REM Formatter."
Two listings for the Apple.

906. Softalk 1 (October, 1980)

Wagner, Roger, "Assembly Lines," pg. 3-4.
Everyone's machine language guide.

907. Dr. Dobb's Journal 5, Iss. 9, No. 49 (October, 1980)

Gordon, H.T., "Opcode Design: 9 or 16 Bits?",
pg. 22-23.
Discussion of 6502 code and codes of other
microprocessors.

908. The Harvest 2, No. 2 (October, 1980)

Peterson, Todd C., "A Free Remote Control for Your
Apple."
Use a receiver, a transmitter, and a patch cord for a
remote control set-up.
Anon., "Parallel vs. Serial Printer Boards," pg. 7.
A discussion of the merits of these two options.
Anon., "Need to Get a Text File to a Printer in Pascal?",
pg. 8.
A pascal starter routine for the Apple.
Holle, Dave, "Physical and Logical Sectors of DOS 3.3,"
pg. 9.
Some information on the new Apple DOS system.
Robbins, Mike, "16 Sector Patch for Dan's Disk Utility,"
pg. 9.
Just two lines added to fix this one up for 16 sectors.
Alexander, Leon, "Leon's Bell," pg. 10.
A short machine program that toggles the bell upon an
INPUT or GET statement on the Apple.

909. The Apple Shoppe 1, No. 7 (July/August, 1980)

Staff, "Pascal PEEK and POKE," pg. 7-8.
A short tutorial for Apple Pascal.
Jeske, Mark, "General Purpose Plotter Program,"
pg. 11-13.
An educational plotting program for Apple.
Staff, "Programming the Graphics Tablet," pg. 14-18.
A tutorial and a Hi-Res Labeling program for the Apple
fitted with a Graphics Tablet.
Crouch, Bill, "Down to Business," pg. 18-20.
A better formatting routine and hints on developing a
business application for the Apple.
Staff, "Spinterm Hi-Res Dump in Assembly," pg. 21-27.
An improved Apple program.
Hugard, James, "Printing in Pascal," pg. 27-29.
Some useful information for Pascal users.

910. O.S.I. Users Independent Newsletter No. 6 (October, 1980)

Curley, Charles, "65D," pg. 2-4.
Here starts a series of articles on the innards of 65D.

911. KB Microcomputing No. 46 (October, 1980)

Baker, Robert W., "PET-Pourri," pg. 12-14.
Proganal is a useful PET utility. Several other items of
PET software are reviewed.

Owens, James, "Computerized Estate Planning,"
pg. 31-35.

An OSI program to take the tedium out of this chore.
Perdue, William H., "PET Mini Monitor," pg. 88-91.
A short PET routine makes creating and saving
machine language programs a snap.

Shawcross, William E., "OSI in the Sky," pg. 102-104.
A mail labeling program for the OSI family.

Carlson, Edward H., "Speed Up Your BASIC Programs,"
pg. 128-130.

Hints for better programs on the OSI C2-4P.

Phillips, Terry Edward, "Whoa, Apple," pg. 132-133.
Two machine language routines to tighten the reins on
galloping video displays.

Greenberg, Gary, "Betting on Old POKEy," pg. 180.
A PET program using the POKE command to enter
graphics.

Bauers, Barton M., Jr., "A Roundoff Function in
Applesoft," pg. 210.

Keep your numbers at a manageable length with this
Apple function.

912. Byte 5, No. 10 (October, 1980)

Zimmermann, Mark, "Floptran-IV: A Tiny Compiler,"
pg. 196-285.

A utility for the PET.

Harrod, Dennette A., "The 6502 Gets Microprogram-
mable Instructions," pg. 282-285.

A hardware approach to adding 64 user-defined instruc-
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913. SoftSide 3, No. 1 (October, 1980)

Laurence, Matthew, "One Liner," pg. 4.
Short graphics program for the Apple.

Clark, Terry, "IMHOTEP," pg. 18-21, 82-84.
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Pelczarski, Mark, "SoftSide Database-Part 2," pg. 22-23.
Program for Atari and Apple. Part 2 of a series.

Bohlke, David, "World Series," pg. 26-28.
A game for Atari.

Garon, James, "Octadraw," pg. 41, 68.
A graphics utility for the Atari.

Ward, Dennis, "Interna-Maze," pg. 43, 64-65.
A maze game for the Apple. Footprints, aerial view and all.

Sandy, Herb, "Moonlanding," pg. 44-45.
A graphics program for Apple.

Bohlke, David, "Double Cannon," pg. 50.
A game in Atari graphics.

Ohlund, Mark A., "Strings and Things," pg. 60-61.
An article dealing with Atari graphics and comparison
with TRS-80 systems.

Bouchard, Rich and Garon, James, "Atari One-Liners,"
pg. 61.

Two shshort programs for the Atari.

Truckenbrod, Joan, "Computer Graphics," pg. 66-67, 80.
Two Apple graphics programs—easily translated to
Atari.

Garon, James, "Hidden Colors in Graphics 8," pg. 69, 74.
A new Atari concept and sample programs.

914. Abacus II 2, Issue 10 (October, 1980)

Britto, Arthur, "No DOS INIT," pg. 2.

This program removes the DOS from a diskette to allow
more room on the diskette. For Apple.

Anon., "IAC Application Note: Pascal Long Integer Fix," pg. 3-4.

This program is designed to repair the library module LONG-INTEGER in Apple Pascal.

Anon., "Pascal Hi-Res LOAD/SAVE to Disk," pg. 4-5.

This Apple Demo creates a Hi-Res picture in Pascal, then saves it to disk. Then it is reloaded and displayed.

Anon., "IAC Application Note: Pascal Utility Program," pg. 8-9.

Program in Apple Pascal which reads from REMIN and writes to disk.

Anon., "IAC Application Note: Linefeed-Pascal Utility." Program to set or defeat Linefeeds, Apple Pascal.

Yee, David R., "Catalorganizer," pg. 12-13.

Organize the catalog on Apple diskettes in alphabetical order.

Anon., "IAC Application Note: COMCARD-Pascal Utility," pg. 13-14.

Program in Apple Pascal to set up COMCARD parameters.

Yee, David R., "Mass Lock and Unlock," pg. 14.

An Applesoft to lock or unlock all the files on an Apple diskette at once.

Anon., "IAC Application Note: Program Foreign—Pascal Utility," pg. 15-18.

A major utility in Apple Pascal.

915. 73 Magazine No. 242 (November, 1980)

Erdei, Steven C., "PL Tones from a KIM-1," pg. 112.

A KIM program that will generate a square wave tone anywhere in the range of 191 Hz to 66 Hz.

916. Personal Computing 4, No. 11 (November, 1980)

Gillie, Michael D., "Printing Pictures from Your PET," pg. 52-54.

A PET program to gather the characters off of the PET screen and print them on the Commodore 2022 printer.

Lubar, David, "Microbiocide," pg. 79-80.

A discussion and hints for debugging programs on the Apple.

917. Byte 5, No. 11 (November, 1980)

Cesa, Louis, "Kinetic String Art for the Apple," pg. 62-63.

High resolution program for the Apple.

Sokol, Dan, "Three-Dimensional Graphics for the Apple II," pg. 148-154.

A novel program for Hi-Res Apple graphics.

Ramsdell, Robert E., "The Power of VisiCalc," pg. 190-192.

All about this interesting piece of business related software for the Apple.

918. The Paper (Summer, 1980)

Haluza, Doug, "Cross Referenced Memory Map," pg. 4-6.

Memory map comparing locations on old and new PET ROMs.

Haluza, Doug, "Machine Language is Faster Than You Think," pg. 7.

Some examples for the PET.

Batcher, Bill, "The Evolution of a Puzzle," pg. 8-9.

A tutorial on handling strings on the PET.

Haluza, Doug, "Machine Language is Still Faster Than You Think," pg. 10-11.

A machine language sort with assembly language routine and a BASIC Demo for the PET.

Comito, JoAnn, "Stringing Your PET Along," pg. 12-15. Two related discussions of Strings with examples, including an expression analyzing string routine for the PET.

Fowler, James, "Assembly Language Programming: Part 1, pg. 16-17.

Part One of a series for the PET programmer.

Eisner, Gerry, "POKE a Border," pg. 17-18.

A utility for the PET, with examples.

Bressler, Ralph, "Moving Around the Screen," pg. 19. A utility for the PET.

Comito, JoAnn, "Not If's, And's or But's," pg. 20-22. A tutorial on the PET's If-Then statement.

Bressler, Ralph, "BASIC Does It Better," pg. 23-25. Discussion of a number of details in PET BASIC.

Haluza, Doug, "Trouble-Shooting Your PET," pg. 26-28. Some hints for reviving the dead PET.

Bressler, Ralph, "Time Passes Quickly," pg. 28-29. A tutorial on the use of the PET timing routine.

Comito, JoAnn, "Writing That Good Educational Program," pg. 30-33.

Two related articles on writing PET educational programs, with examples.

Bressler, Ralph, "PET Files," pg. 36-39.

A tutorial for PET Tape Files and a sample listing.

Comito, JoAnn and Bressler, Ralph, "Merging Programs," pg. 40-41.

All about the PET merge system.

Haluza, Doug, "An 80 by 50 Plotting Routine," pg. 42.

A PET listing for a plotting program.

Haluza, Doug, "PEEKing at BASIC," pg. 42-43.

A utility for PET.

Bressler, Ralph, "PET's Round Off Problems," pg. 43, 48.

919. The Harvest 2, No. 3 (November, 1980)

Lyle, Guy A., "Float, Float, Float Your Point," pg. 1-5.

A tutorial on floating point representation on the Apple.

920. Nibble No. 6 (November, 1980)

Connolly, Rick, "P.I.P. II: PIP Goes Disco," pg. 9-13.

A disk version of P.I.P. (Personal Inventory Program).

Litwin, Larry M., "A Simplified Way For a Tiger to Eat Apple Pie," pg. 21-22.

An Apple graphics Pascal program outputting to a Paper Tiger.

Mottola, R.M., "Amper-Interpreter," pg. 27-44.

Add "Print-Using" to your Apple's Instruction Set.

Harvey, Mike, "Blocking Very Large Files," pg. 45-47.

A technique for file management on the Apple.

Figuera, John, "Roundoff!," pg. 47.

Round off decimal values to a manageable format on the Apple.

Reynolds, William III, "Finding the Slot Number," pg. 48.

How to write programs addressing interface cards on the Apple.

Harrell, Keith, "Pascal Pointers and Principles," pg. 51-52.

A new column for Apple pascal programmers.

Rogan, J.A., "Four-In-A-Row," pg. 55.
A Lo-Res graphics game for the Apple.

Crossman, Craig, "An Assembly Language Tutorial," pg. 57.
This installment discusses the Screen Clear, RDKEY, and COUT in the Apple monitor.

Crossman, Craig, "Apple Tricks," pg. 59.
More Apple tricks including Fast DOS, Special Characters, and Unstable programs.

921. Iridis 2 (November, 1980)

Staff, "Fontedit," pg. 2-22.
A program to allow the Atari user to design character sets. Listing and complete information on the design and use of the program.

Staff, "Knotwork," pg. 22-36.
How to design a type of manuscript illumination in Atari programs. Listing and complete description.

Staff, "Hacker's Delight," pg. 36-46.
A compendium of useful memory locations for the Atari operating system.

Staff, "Loadfont," pg. 46-49.
A utility for use in writing programs on the Atari using private fonts.

922. KB Microcomputing No. 47 (November, 1980)

Smith, Wayne D., "A Mini Logic Monitor and Single-Cycler for Hardware Debugging," pg. 59-66.
Hardware for your KIM-1.

Bugg, Michael L., "Tinkering with Tiny BASIC," pg. 88-96.
Add four new and useful commands to Tiny BASIC as implemented on the KIM-1.

Brock, Thomas D., "Hard Copy for Apple Graphics," pg. 100-102.
Software for printing the high-resolution screen using a Diablo printer.

Bruey, Alfred J., "Microcomputer Hardware for the Handicapped," pg. 173-174.
Single-key data entry for the PET.

923. Recreational Computing 9, No. 3, Issue 48 (November/December, 1980)

Berggren, Stephen R., "DOZO in Pascal," pg. 32-36.
A Japanese DOZO game in Apple Pascal.

924. Creative Computing 6, No. 11 (November, 1980)

Guerard, Michael P., "Another Slice of Pi," pg. 8.
A way around a minor bug in arcsine and arccosine functions in Applesoft and TRS-80 Level II BASIC.

Piele, Donald T., "How To Solve It—with the Computer," pg. 66-71.
Part 3 of this series discusses Apple graphics and FOR—NEXT statements.

Kielian, Greg, "Bombproof Data Entry," pg. 102-104.
Unusual data entry methods for the Apple.

Lubar, David and Forsen, Richard, "Car Race: Anatomy of a Translation," pg. 118-119.
Translation for the Apple from a program written for a DEC PDP/11.

Yob, Gregory, "Personal Electric Transactions," pg. 164-169.
PET music programs, hardware for blinking lights with the PET, and a video car driver game.

Blank, George, "Outpost: Atari," pg. 170-171.
Atari Pascal is on the way, Atari Visicalc is available, also description of the PIA, ANTIC, CTIA, and POKEY chips for Atari.

Carpenter, Chuck, "Apple-Cart," pg. 172-180.
Absolute indexing, Indirect indexing, Interrupts, etc. on the Apple.

925. MICRO No. 30 (November, 1980)

Williams, Richard, "How to Use the Hooks," pg. 7-9.
Hooks allow the user to break the normal flow of control and redirect the Apple to his own routine.

Hart, John E., "An Ultra-Fast Tape Storage System," pg. 11-14.
A simple hardware modification to the OSI Superboard and a good home tape recorder yield data-transfer rates of up to 9600 baud.

Sebra, Randy, "SYM-Bell," pg. 17-24.
Use your SYM as a telephone memory dialer.

Morse, P. Kenneth, "Self-Modifying PET Programs," pg. 29-31.
A tutorial on writing a self-modifying program.

Needleman, Ted, "General Ledger for the Apple II," pg. 33-34.
The SBCS general ledger is a major business program for the Apple II. A review.

Froelich, Jerry W., M.D., "Microprocessors in Medicine: the 6502," pg. 36.
How the 6502 microprocessor is able to perform tasks in medical education nearly as well as large computer systems.

Morris, E.D., Jr. and Finkbeiner, Tim, "Ohio Scientific Users: Stop Those S⁻ Errors," pg. 37-39.
Correct the BASIC error message output, put out messages of your own, etc.

Allen, David P., "A Versatile Hi-Res Function Plotter for the Atari 400 and 800," pg. 47-50.
Discussion and listing of an Atari color graphics program.

Bridge, Theodore E., "John Conway's Game of Life Using Display Devices with Automatic Scrolling," pg. 53-58.
A KIM listing easily adapted to other 6502-based micros.

Peterson, Craig, "Step and Trace for the Apple II Plus," pg. 61-63.
Restore the Step and Trace functions of the original Apple II.

Flynn, Christopher J., "AIM 65 File Operations: Writing Text Files with BASIC," pg. 65-70.
The value of AIM BASIC is greatly enhanced with this technique of writing text files.

Rowe, Mike (Staff), "The MICRO Software Catalog: XXVI," pg. 72.
Review of five new 6502 software items.

Dial, William R., "6502 Bibliography: Part XXVI," pg. 76-77.
Some fifty-five new references to the 6502 literature.

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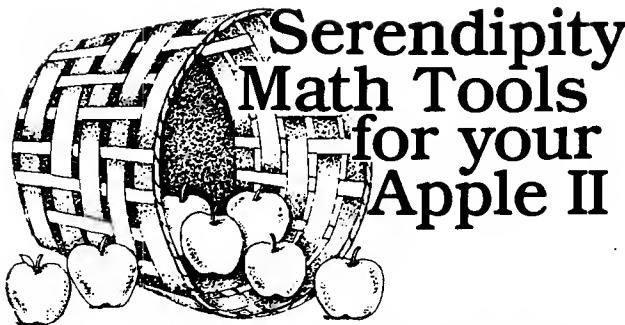
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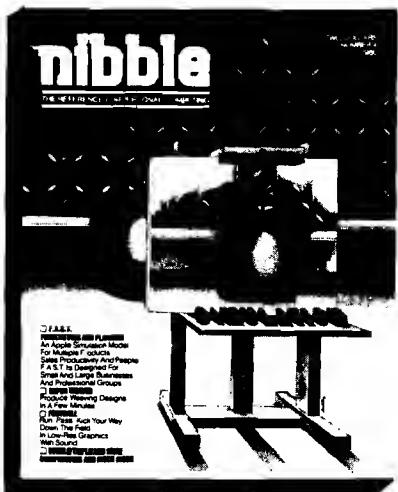
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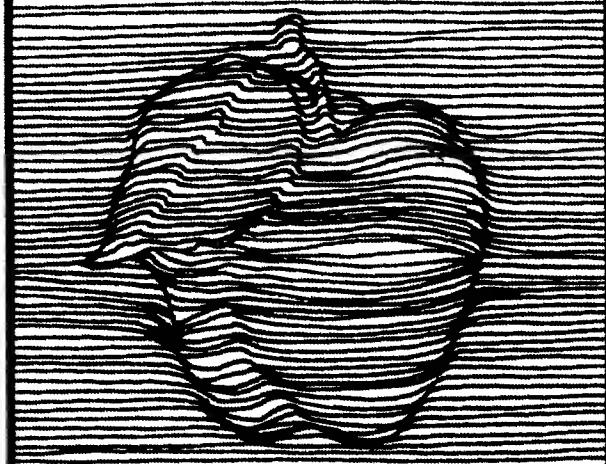
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The C8P DF utilizes full size 8" floppy disks and is compatible with Ohio Scientific's advanced small business operating system,

OS-65U and two types of information management systems, OS-MDMS and OS-DMS. The computer system comes standard with a high-speed printer interface and a modem interface. It features a full 53-key ASCII keyboard as well as 2048 character display with upper and lower case for business and word processing applications.

Home Control

The C8P DF has the most advanced home monitoring and control capabilities ever offered in a computer system. It incorporates a real time clock and a unique FOREGROUND/BACKGROUND operating system which allows the computer to function with normal BASIC programs at the same time it is monitoring external devices. The C8P DF comes standard with an AC remote control interface which allows it to control a wide range of AC appliances and lights remotely without wiring and an interface for home security systems which monitors fire, intrusion, car theft, water levels and freezer temperature, all without messy wiring. In addition, the C8P DF can accept Ohio Scientific's Votrax voice I/O board and/or Ohio Scientific's new universal telephone interface (UTI). The telephone interface connects the computer to any touch-tone or rotary dial telephone line. The computer system is able to answer calls, initiate calls and communicate via touch-tone signals, voice output or 300 baud modem signals. It can accept and decode touch-tone signals, 300 baud modem signals and record incoming voice messages.

These features collectively give the C8P DF capabilities to monitor and control home functions with almost human-like capabilities.

Process Controller

The C8P DF incorporates a real time clock, FOREGROUND/BACKGROUND operation and 16 parallel I/O lines. Additionally a universal accessory BUS connector is accessible at the back of the computer to plug in additional 48 lines of parallel I/O and/or a complete analog signal I/O board with A/D and D/A and multiplexers.

Clearly, the C8P DF beats all existing small computers in conventional specifications plus it has capabilities far beyond any other computer system on the market today.

C8P DF is an 8-slot mainframe class computer with 32K static RAM, dual 8" floppies, and several open slots for expansion.

Prices start at under \$3,000.

Computers come with keyboards and floppies where specified. Other equipment shown is optional.

For literature and the name of your local dealer, CALL 1-800-321-6850 TOLL FREE.

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